48 and 49

We will occupy the above booths at the

National Railway Appliances Association

EXHIBITION

to be held at the International Amphitheatre, Chicago, March 10-13, 1941, where you will see *THE IMPROVED FAIR RAIL ANCHOR.*

Something New in Rail Anchors

THE P. & M. CO.

CHICAGO • NEW YORK • MONTREAL • LONDON • PARIS • CALCUTTA • SYDNEY

Reliance HY-CROME Spring Washers

HY-CROME PRESSURE SPRING

BOLTED ASSEMBLIES subject to service stresses and strains, inevitably develop looseness as a result of wear.

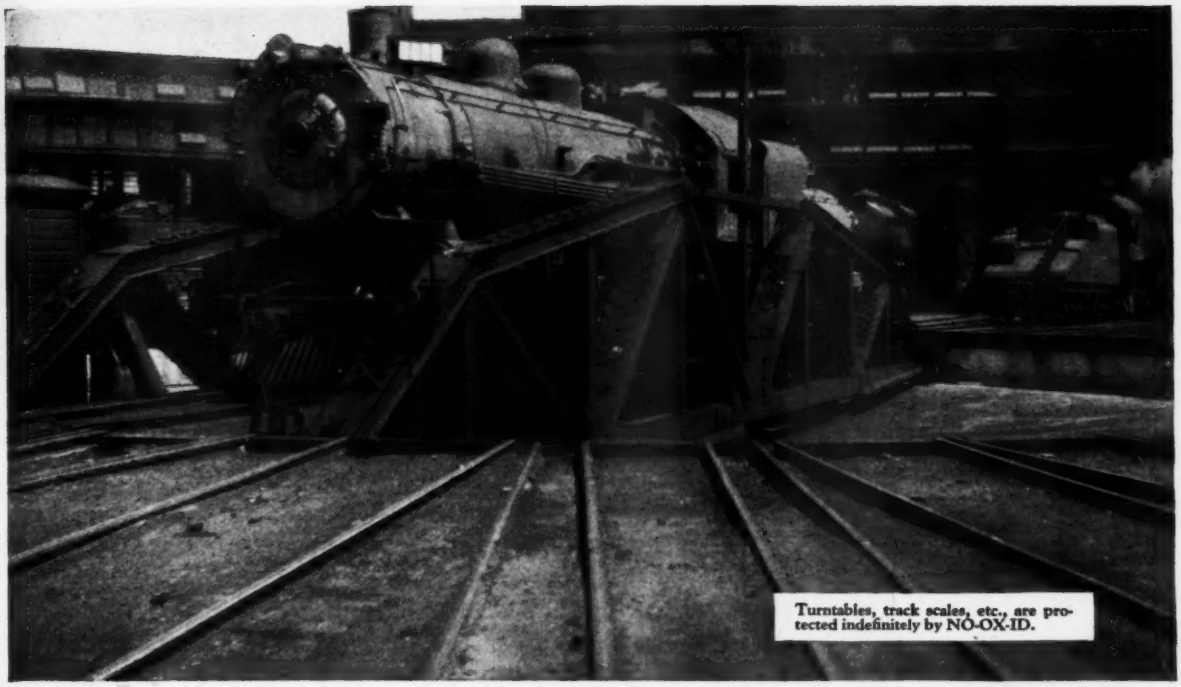
HY-CROME PRESSURE SPRINGS maintain exceptional tension which retards wear and keeps bolts tight. Investigate the latest development in spring washers.

•

We look forward to greeting you at Booth 31, at the N.R.A.A. Exhibit, International Amphitheatre, during the A.R.E.A. Convention, March 10th to 13th.

EATON MANUFACTURING CO. RELIANCE SPRING WASHER DIVISION, MASSILLON, O.

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal



Turntables, track scales, etc., are protected indefinitely by NO-OX-ID.

Protect Your Steel at Half the Cost

STOP CORROSION ON TURNTABLES AND TANKS WITHOUT EXPENSIVE CLEANING

NO-OX-ID protects tanks outside and inside. It does not contaminate the water.

You can cut your maintenance costs in two by applying NO-OX-ID on your turntables, tanks, and other steel structures. NO-OX-ID eliminates expensive cleaning, which comprises at least half the cost of keeping steelwork free from corrosion.

Here's how NO-OX-ID works. When applied on clean metal, it forms a protective film that lasts indefinitely. When applied on rusted steelwork, it penetrates to the base metal and immediately prevents further corrosion. In localized areas on the metal surface, where rust scale may be particularly heavy, NO-OX-ID stops corrosion and loosens the scale so that it falls off. Then, a final touching up of the scattered bare spots will prevent any further loss of metal. Write for data.

DEARBORN CHEMICAL COMPANY
Dept. U, 310 S. Michigan Ave., Chicago, Ill.
New York • Los Angeles • Toronto

NO-OX-ID
IRON-OX-RUST
TRADE MARK
The Original Rust Preventive

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago, Ill. Subscription price: United States and Possessions, and Canada, $2.00; Foreign, $3.00. Single copies 35 cents. Entered as second-class matter January 20, 1933, at the postoffice at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., postoffice. Address communications to 105 W. Adams St., Chicago, Ill.

WOODINGS-VERONA *Fixed Tension* TRIFLEX SPRING

1—HIGHEST REACTIVE SPRING PRESSURE.

Woodings-Verona *Fixed Tension* Triflex Spring exceeds A.R.E.A. requirements for reactive spring pressure by 2 1-2 times.

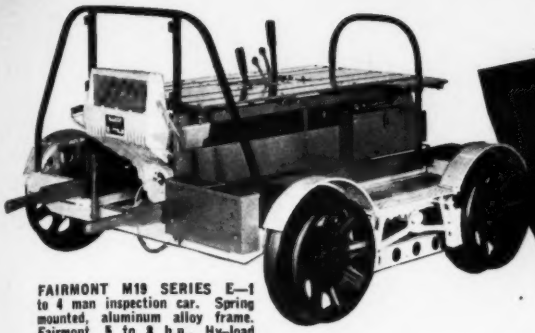
2—WOODINGS-VERONA *Fixed Tension* TRIFLEX SPRING provides definite and simple means of determining and establishing equal tension in all track bolts.

SINCE 1873

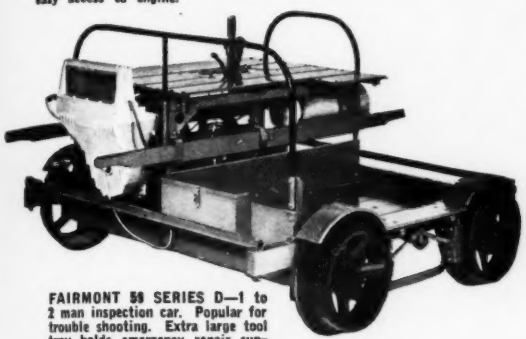
WOODINGS-VERONA
TOOL WORKS VERONA, PA.

SINCE 1873

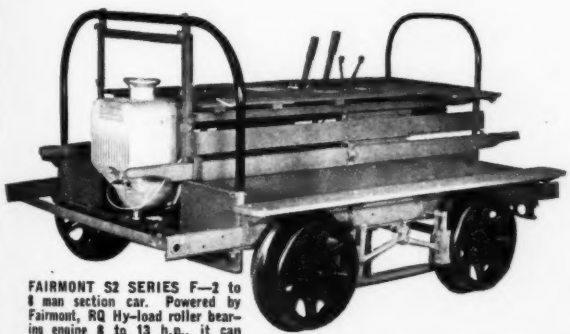
Designed for DEPENDABILITY



FAIRMONT M19 SERIES E—1 to 4 man inspection car. Spring mounted, aluminum alloy frame. Fairmont, 5 to 8 h.p., Hy-load roller bearing engine. Endless cord belt drive with Timken tension control. Removable seat top for easy access to engine.



FAIRMONT 50 SERIES D—1 to 2 man inspection car. Popular for trouble shooting. Extra large tool tray holds emergency repair supplies. Powered by Fairmont, RO Hy-load roller bearing, 5 to 8 h.p. engine.

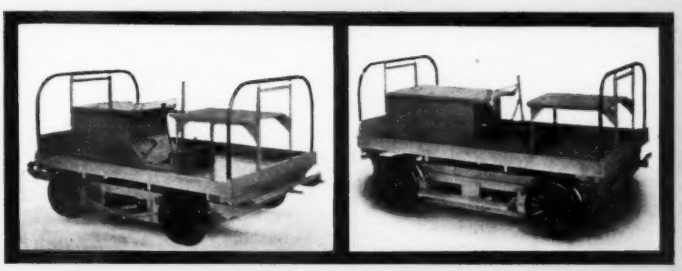


FAIRMONT S2 SERIES F—2 to 8 man section car. Powered by Fairmont, RQ Hy-load roller bearing engine 8 to 13 h.p., it can serve largest standard sections or can be used on inspection service by two men.

FAIRMONT M14 SERIES G—2 to 6 man light section car. Suitable for full size section gangs or for use by only 2 men. Rear lift using extension lift handles is only 105 lbs.

The Fairmont line of Railway Motor Cars includes a model and size for every transportation requirement. Among the inspection, section, and 2-speed gang cars, a choice of ball bearing or roller bearing engines is offered. All Fairmont cars have an ample reserve of power for any task for which they are designed and are ruggedly built to insure many extra years of dependable, trouble-free performance. Fairmont Railway Motors, Inc., Fairmont, Minnesota.

Performance ON THE JOB COUNTS



FAIRMONT A5 SERIES C—3 to 8 man gang car. Powered by 36 h.p. engine, this car can pull 13 trailers loaded with 260 men at 30 m.p.h. on level track.

FAIRMONT A8 SERIES C—3 to 10 man gang car. Its 85 h.p. Ford V8 engine and 4 speed transmission and propeller shaft drive have ample power for the largest extra gang car service.

FAIRMONT S2 SERIES G—2 to 10 man heavy duty section car. Powered by Fairmont, RQ Hy-load roller bearing engine 8 to 13 h.p., this ruggedly built, roomy car can tow one to two loaded trailers up grades with maximum economy.

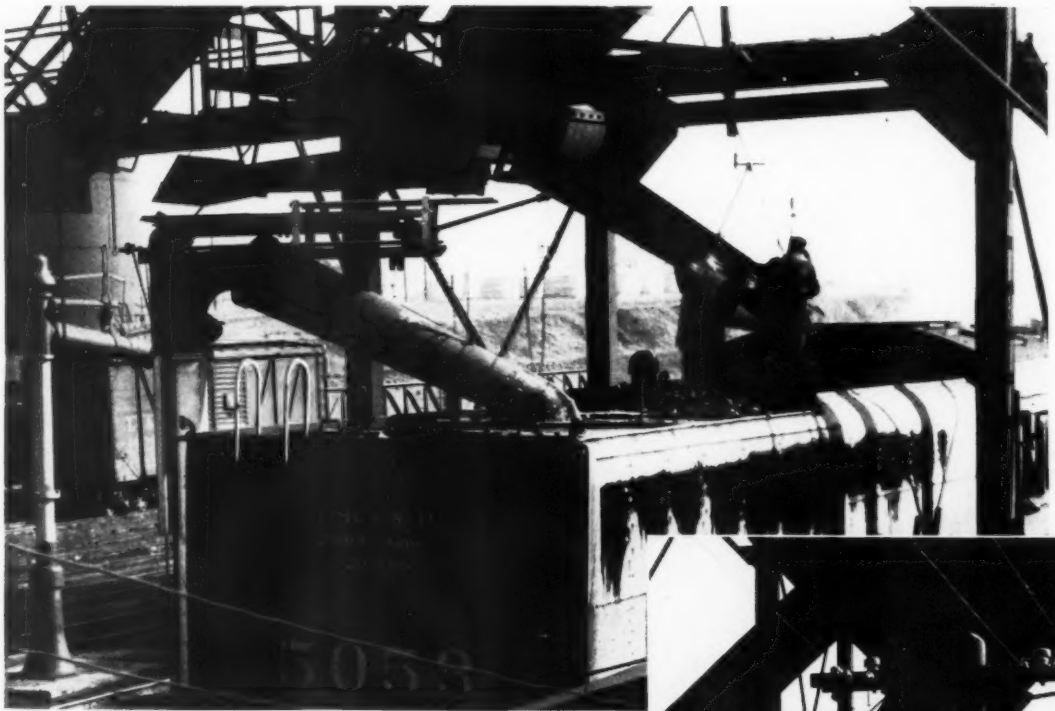
FAIRMONT A2 SERIES C—2 to 12 man heavy duty section car. Built for many extra years of dependable performance under the most difficult kinds of service, the A2 series C is especially desirable where large gangs are used.

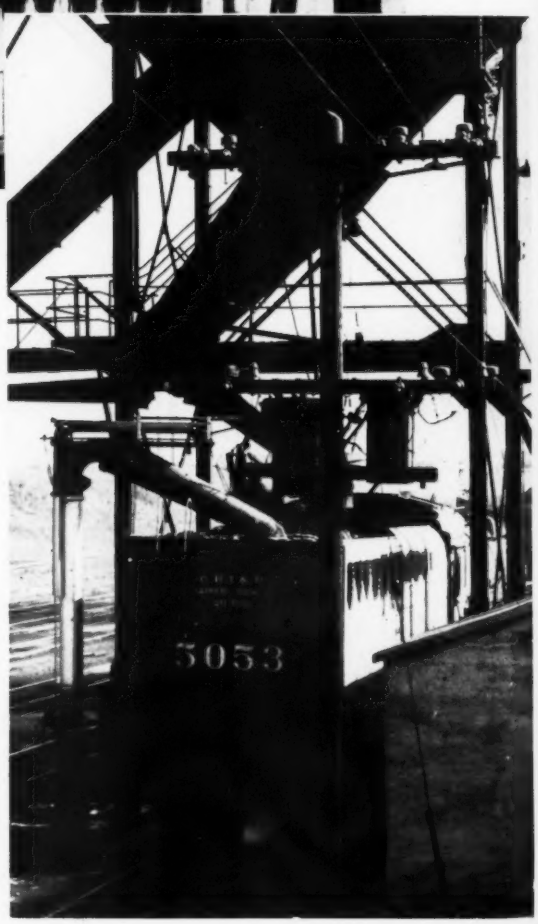
Fairmont

OF ALL THE CARS IN SERVICE TODAY MORE THAN HALF ARE FAIRMONTS

6,000 GALLONS PER MINUTE!

ONE-STOP Servicing Cuts Time to 4 Minutes





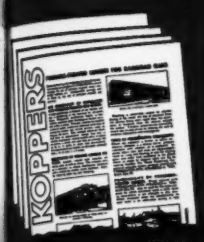
This new SNOCO water crane delivers water to the Rock Island's large modern tenders in jig time, averaging 16,000 Gal. in less than 3 minutes. The crane was located adjacent to coal and cinder-handling facilities so that locomotives take coal and water simultaneously while over the ash pit.

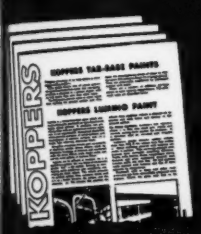
1. Rapid delivery capacity saves precious road time.
2. Counterbalanced spout requires no manual attention when in full delivery position, frees attendant to assist in coaling activities.
3. Valve is specially-designed to eliminate excessive surges from the exceptionally high velocities.

T. W. Snow Construction Co.

332 So. LaSalle Street Chicago

KOPPERS





KOPPERS IS FIRST AGAIN!

Underwriters Laboratories Awards Class A Rating to Koppers Steep Roofs

Koppers Steep Built-up Roofs constructed of Steep Coal Tar Pitch and Tarred Rag Felts with slag surfaces have been awarded the Class A Rating by the Underwriters Laboratories, Inc.

Koppers Flat Roofs of Coal Tar Pitch and Tarred Rag Felts have had the Class A rating for fire resistance for more than 20 years. Koppers Steep Roofs provide for steep slopes the same long life, the same resistance to water, weather, and fire that have made coal tar pitch and tarred felt the outstanding materials for flat built-up roofs.

Four and five ply Tarred Rag Felt roofs with slag surfaces embedded in Steep Pitch, applied in accordance with the specifications of the Koppers Company, now take a Class A rating on both combustible and non-combustible roof decks.

Koppers Steep Roofs have been constructed in many sections of the country over a considerable period of years. These roofs have been inspected by the Underwriters' Laboratories for their performance under actual service conditions and the completed roofing has also been subjected to all the laboratory tests for resistance to fire and to spread of fire.

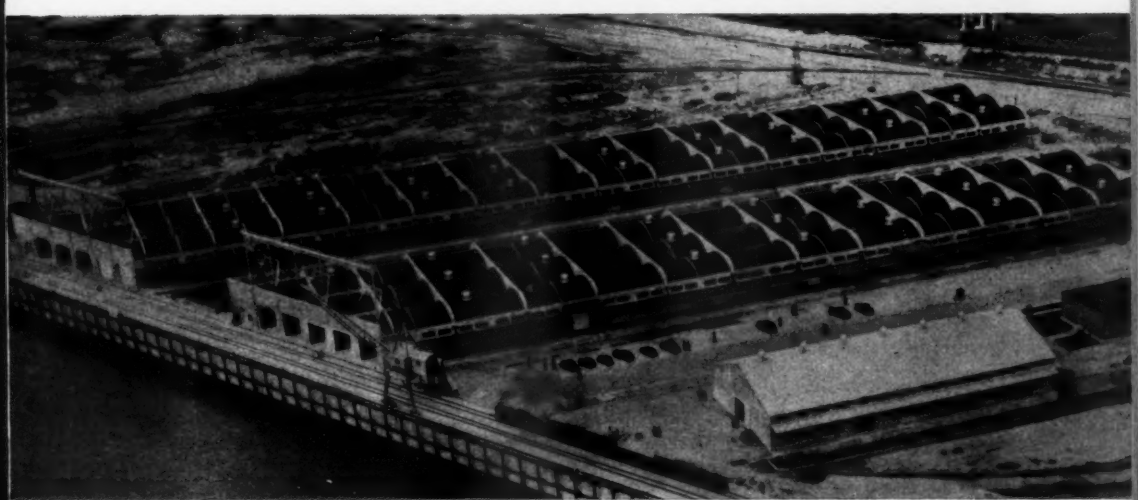
Koppers Steep Roofs are firmly and mechanically anchored in place. They can be bonded for 10, 15 or 20 years. On buildings where there are both flat and steep roof surfaces, the entire area can now be bonded, when Koppers Built-up Roofing is specified.

See specifications for Koppers Steep Roofs in Sweet's, or send for a copy of the Koppers Roofing Book.

Specify that all roofing materials must carry Underwriters' Labels.

KOPPERS COMPANY
Tar and Chemical Division
KOPPERS BUILDING · PITTSBURGH, PA.

262,000 sq. ft. of Koppers Steep Roofing was used on the Deepwater Terminal, Richmond, Va.



use KOPPERS *products*

KOPPERS COMPANY, 122 Koppers Building, Pittsburgh, Pa.
Please send me copies of the following folders:

- ☐ "Steep Roofs of Coal Tar Pitch"
- ☐ "Tar-base Paints"
- ☐ Construction and Maintenance with Tarmac"
- ☐ "Membrane Waterproofing"
- ☐ "Pressure-treated Car Lumber"
- ☐ "Pressure-treated Timber"
- ☐ "Pressure-treated Prefabricated Culverts"
- ☐ "The Painting of Creosoted Wood"
- ☐ "How to Measure the Quality of Pressure Treatments"
- ☐ "Pressure-treated Highway Bridges"
- ☐ "Pressure-treated Posts"
- ☐ "Creosote"
- ☐ "Creosote-Coal Tar Solutions"
- ☐ "Kolineum"
- ☐ "Disinfectants"
- ☐ "Coal for Railroad Use"

Your Name.....

Title.....

Company.....

Address.....

WHEN

- WORK IS HEAVY
- TIME IS SHORT
- FORCES ARE FEW
- APPROPRIATIONS ARE LIMITED

Heavier track maintenance programs are in the making for 1941 because of increased freight traffic, the urgent need for still faster freight trains and the demand for better riding track for high speed passenger service.

But . . .

. . . *the working season remains the same,* which means that every job must be completed as quickly as possible.

. . . *a probable scarcity of labor* is indicated by increased industrial and building activities, the national defense program, etc.

. . . *the same dollar can't be spent twice;* hence, every job must be performed as economically as possible.

THE WOOLERY TIE CUTTER

will save you time, labor, money in your tie renewals

As a time-saver . . . One important road renewed 7,583 ties in 25½ days with 18 men with the Woolery Tie Cutter.

As a labor-saver . . . The Woolery Tie Cutter needs only one man to operate it; weighing only 307 lb., it is easily wheeled or rolled along the rail.

As a money-saver . . . One Class I road saved more than 12 cents per tie renewed by using Woolery Tie Cutters; the machine normally pays for itself in 30 to 60 days.

Let us demonstrate on your road, at no obligation to you, or see the Tie Cutter operate at the NRAA Exhibit in Chicago, Mar. 10-13.

WOOLERY MACHINE COMPANY

MINNEAPOLIS Pioneer Manufacturers of MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

TIE CUTTERS • SWITCH HEATERS • MOTOR CARS

RAILWAY WEED BURNERS • BOLT TIGHTENERS

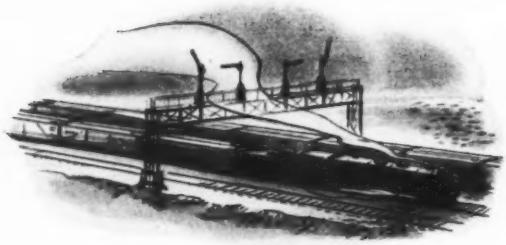
LUNDIE TIE PLATE

Prolongs the Life of Cross Ties
Increases the Life of Rails and Wheels
Holds Track to Gauge
Affords Easy Riding Track
Promotes Safety

THE LUNDIE ENGINEERING CORPORATION

Tie Plates—Spring Rail Clips—Safety Tongs for Handling Track Material—Aladdin Rail and Flange Lubricator

19 WEST 50th ST., NEW YORK **59 E. VAN BUREN ST., CHICAGO**



So that Traffic

These and Other Oxweld Methods Are Used to Maintain Way and Structures at Peak Efficiency

WITH a demand for "speed" and "more speed" in national production, America is looking to the railroads to keep essential materials moving smoothly forward to their destination.

The welding and heating applications pictured here are a few of the many oxy-acetylene operations which Oxweld Railroad Service features in its complete service program. They show money-saving procedures which can be used on new rail to reduce or eliminate batter and maintenance, and on worn rail to restore it to original surface, with added wear resistance assuring it many more years of usefulness in first position.

Through 1941, more than ever before, Oxweld Railroad Service stands ready, with the aid of its entire organization, to help provide and maintain smooth riding rails for both passenger and freight traffic.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation

UCC

Carbide and Carbon Building — Chicago and New York

The word "Oxweld" is a trade-mark of a Unit of Union Carbide and Carbon Corporation.

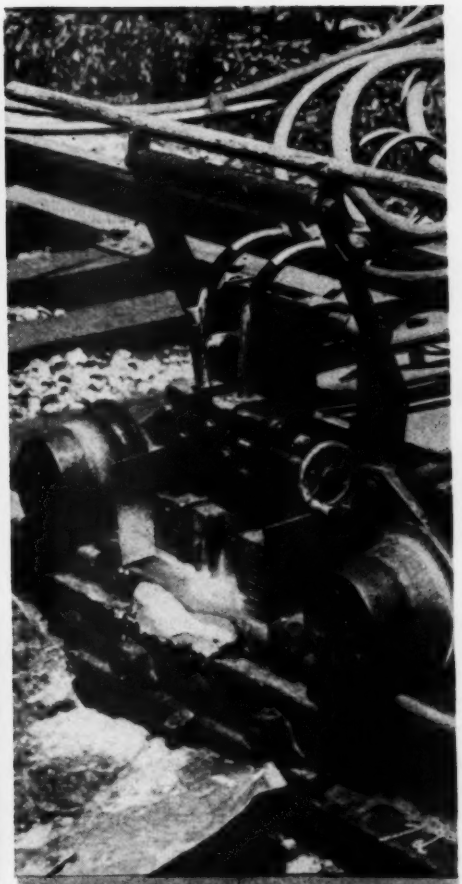
You can learn more about these time-and money-saving Oxweld methods at Exhibit Areas 87-88, National Railway Appliances Association Exhibit, International Amphitheatre, Chicago, March 10-15.

BUILDING UP RAIL ENDS—Battered rail ends are rebuilt to original surface and a wear-resistant surface is applied to each worn rail end with Oxweld's M W Steel welding rod.

SINCE 1912 — THE

May Move Smoothly . . .

BUTT-WELDING OF RAIL—The Oxweld pressure butt-welding method eliminates rail joints and thereby does away with rail batter and joint maintenance. It is especially adapted for use in stations, tunnels, street crossings, and on bridges. This method, and the equipment which is used to apply it, are kept up-to-date and efficient by Oxweld as a further service to American railroads.



END-HARDENING OF RAIL—This oxy-acetylene process, applied to new rail in track, produces rail ends which are within the hardness range established as most effective in resisting batter.

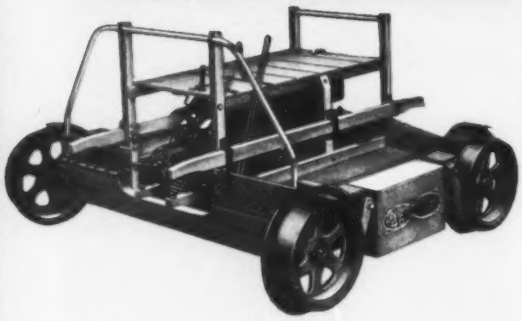
COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

FAIRBANKS-MORSE *Sheffield*

THE BEST SIZES AND TYPES FOR EVERY NEED

INSPECTION CARS

9 MODELS • WATER-COOLED • AIR-COOLED
CHAIN DRIVE • BELT DRIVE



Sheffield Model 46. Light enough for one man to handle easily. Seats two men, with ample deck space for equipment. Air-cooled 6-h.p. engine—more than 50 miles per gallon. *Chain drive.* Write for Bulletin ARB 204.1.

Sheffield Model 86. Primarily for one-man inspection service, yet can comfortably carry two. Rear lifting weight only 98 pounds. Air-cooled 5- to 8-h.p. engine. Chain drive. Write for ARL 830.1.

Sheffield Model 56. Similar to 86 except water-cooled.

Eclipse Model 786. Similar to 86 except belt-driven.

Eclipse Model 756. Similar to 86 except water-cooled and belt-driven.

Sheffield Model 54. For one to four men, yet one man can handle it. Rear lifting weight only 100 pounds. Water-cooled 5- to 8-h.p. engine. Chain drive. Ask for Bulletin ARB 760.1.

Sheffield Model 84. Similar to 54 except air-cooled.

Eclipse Model 754. Similar to 54 except belt-driven. Described in Bulletin ARB 770.1.

Eclipse Model 784. Similar to 54 except air-cooled and belt-driven.

First on the rails

It takes more than one or two outstanding features to make a good motor car. It takes good design and rugged, precise construction throughout. That's why Fairbanks-Morse Sheffield Motor Cars, first on the rails, are *still first.*

Be just as tough when buying a motor car as you want the car to be when it's in service! Check all parts of the engine—pins, rods, cooling system, ignition. Compare frames, wheels, weight, maneuverability, riding quali-

EXTRA GANG and B&B CAR

Sheffield Model 408. Two-cylinder engine, air-cooled, permits full-load operation for hours without overheating. Conservatively rated at 8½ h.p. at 1000 r.p.m. and develops exceptionally high torque at low speeds. Friction transmission. Chain drive. Steel frame. Write for Bulletin No. 7115.

FAIRBANKS, MORSE & CO.

600 SOUTH MICHIGAN AVENUE, CHICAGO, ILLINOIS

AND *Eclipse* MOTOR CARS . . .

and *Still First*

ties, safety provisions. Compare clutches—and just try to burn out a Sheffield clutch!

All cars bearing the Sheffield name have *chain drive*—widely preferred for its dependability under all adverse conditions, and the best type for emergency use in deep snow and high water.

The Eclipse line offers belt drive, but in other respects closely parallels the Sheffield line.

Instruction books and parts lists on any Fairbanks-Morse railroad equipment will gladly be sent on request.

See Fairbanks-Morse railway equipment at the National Railway Appliances Association Exhibition

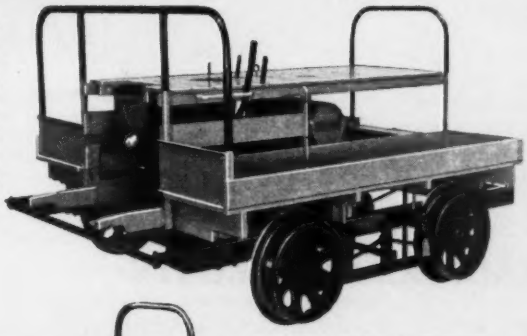
SECTION CARS

6 MODELS • WATER-COOLED • AIR-COOLED
CHAIN DRIVE • BELT DRIVE

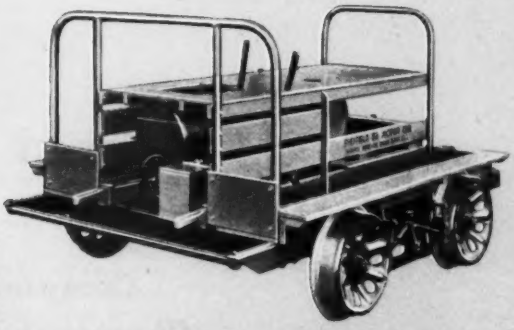
Sheffield Model 85. Lightweight, full-sized section car, weight 700 pounds. Has alloy steel frame, safety tread metal toe boards, pipe safety rails, side outlet exhaust, self-centering brakes with cast-iron faced brake shoes, removable seat top. Rear lifting weight only 101½ pounds. Air-cooled 8-h.p. engine, chain drive. Described in ARL 820.1.

Eclipse Model 785. Similar to 85, but belt-driven.

Sheffield Model 58. A lightweight section car for a six-man gang and their tools. Weight, only 840 pounds. Rear end lift only 117 pounds. Water-cooled 5- to 8-h.p. engine. Chain drive. Send for Bulletin ARB 700.10.



Sheffield Model 44B. The standard section car on many class 1 railroads. Sturdy, roomy. Weighs 1095 pounds. Has ample power to haul trailers loaded with men and tools or ties. Water-cooled 8- to 13-h.p. engine with air-cooled head. Chain drive. Send for Bulletin ARB 230.1.



Sheffield Model 53. Weighs only 929 pounds, with rear end lift of only 124½ pounds. Has 8- to 13-h.p. water-cooled engine with air-cooled head. Chain drive. Space for full section gang and tools. Ask for Bulletin ARB 700.1.

Eclipse Model 709. Similar to 53 but belt-driven. See Bulletin ARB 750.1.

TIMKEN BEARING EQUIPPED

F M

RAILROAD SALES OFFICES: NEW YORK • CHICAGO • ST. LOUIS • ST. PAUL
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STOP WEED INVASION

DEFEND YOUR TRACK

USE

ATLAS "A" ARSENICAL

ATLACIDE CHLORATE WEED KILLER

THE PROVEN CHEMICAL WEED KILLERS

Before Treatment **After Treatment**

LOWER MAINTENANCE COSTS

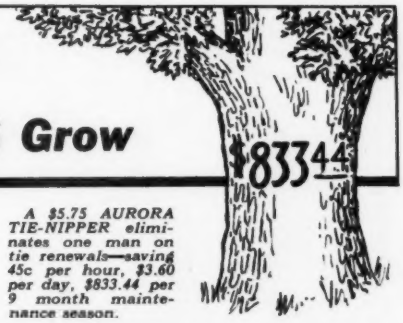
Complete Weedkilling Service
Chemicals—Equipment—Supervision

CHIPMAN CHEMICAL COMPANY, Inc.

BOUND BROOK, N. J.

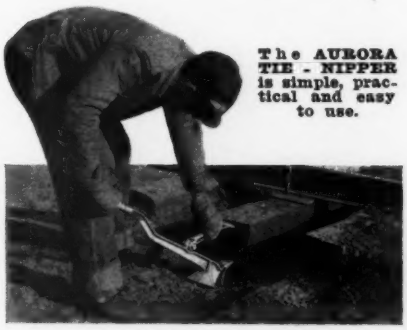
Chicago, Ill., Palo Alto, Cal., No. Kansas City, Mo., Houston, Tex., Winnipeg, Can.

Where Small Investments into MIGHTY SAVINGS Grow

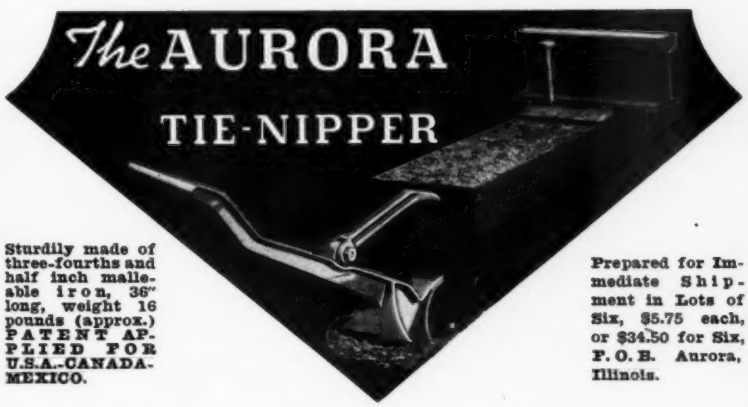


A $5.75 AURORA TIE-NIPPER eliminates one man on tie renewals—saving 45c per hour, $3.60 per day, $833.44 per 9 month maintenance season.

Every now and then a very simple idea comes along to cause even the most conservative railroad man to say, "Boy, that's a natural!" That's what they are saying about the AURORA TIE-NIPPER. It's the outstanding "natural" of the year by EVERY test of merit. It was developed by practical railroad men. It drastically reduces manpower required on maintenance of way work—it promotes safety—increases productive hours and delivers such impressive economies at a small investment cost that it takes top rank as a "MUST" in standard maintenance of way equipment.



The AURORA TIE-NIPPER is simple, practical and easy to use.



Sturdily made of three-fourths and half inch malleable iron, 36" long, weight 16 pounds (approx.) PATENT APPLIED FOR U.S.A.-CANADA-MEXICO.

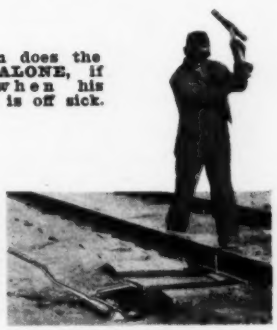
Prepared for Immediate Shipment in Lots of Six, $5.75 each, or $34.50 for Six, F. O. B. Aurora, Illinois.

The foreman and ONE laborer do the Tamping and Spiking.

A Major Improvement in Maintenance of Way Work

- **No longer need the section foreman shield his eyes from flying spikes or spike maul chips as he nips the tie with a lining bar, while his TWO laborers do the spiking.**
- **No longer will the foreman sit on the end of the lining bar (a hazardous practice) while his TWO laborers do the tamping.**
- **The AURORA TIE-NIPPER releases the foreman for spiking and tamping. This saves the wages of one man. Figure it yourself @ 45c per hour over a 9 months maintenance season. Every railroad NEEDS AURORA TIE-NIPPERS.**
- **Even when the ONE remaining laborer is off sick, the foreman can do the entire job ALONE. You'll agree that the AURORA TIE-NIPPER is a "natural."**
- **The B & B departments, too, will find notable value in the AURORA TIE-NIPPER. The man working on deck of bridge can do his own nipping of deck ties or bridge stringers without the assistance of a helper. We've designed the JUNIOR AURORA TIE-NIPPER especially for this work.**

You can see the AURORA TIE-NIPPER completely demonstrated at the NATIONAL RAILWAY APPLIANCE SHOW (Area 122), International Ampitheatre, Chicago, March 10-13.



The Foreman does the entire job ALONE, if necessary, when his ONE laborer is off sick.

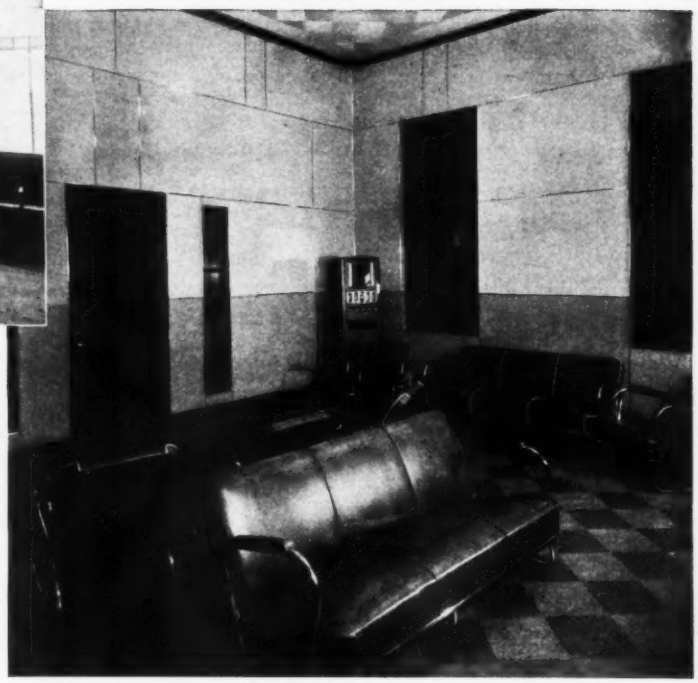
Order a lot of six. Distribute them among your surfacing gangs for opinions of different individuals.

Price is non-retroactive and subject to change without notice.

AURORA
RAILWAY SUPPLY CO.
AURORA ILLINOIS

From this "Old Timer"

This "NEW" waiting room



MODERNIZED at LOW COST with J-M MATERIALS

ALL over the country, "Old Timers" like this one are today having their faces lifted. And the transforming of their outmoded dinginess into attractive, modern interiors is a surprisingly easy and economical operation.

Beauty treatment for the station shown above, for example, was effected with the aid of these modern J-M Building Materials:

ON WALLS—J-M Asbestos Flexboard, a fireproof, colorful *flexible* asbestos-cement sheet. Easily worked, easily applied on new jobs or over old walls.

ON FLOOR—J-M Asphalt Tile Flooring. Tough, durable, resilient, easily cleaned with soap and water. Available in many attractive colors. Takes the punishment of station use with little or no maintenance.

ON CEILING—J-M Insulating Board Panels in variegated colors. Durable, decorative, inexpensive. Various decorative patterns possible by combining colors and sizes. Can be applied over old ceilings.

The low cost of these J-M Building Materials has brought the modernization of building interiors within the reach even of limited maintenance budgets. Exteriors, too, are being modernized inexpensively with fireproof J-M Asbestos Roofing and Siding Shingles. For details, write Johns-Manville at New York, Cleveland, Chicago, St. Louis or San Francisco.

JM

JOHNS-MANVILLE 83 YEARS OF SERVICE TO TRANSPORTATION

Your "GREEN LIGHT" to Greater Profit in '41 . . . .

You travel on a continuous "green light" to profits when you use Worthington Rock Drills, Air Tools and Portable Compressors. You subtract from your expenses and add to your earnings when you take advantage of the cost-cutting features offered by Worthington equipment. Climb on the bandwagon with the ever-increasing number of contractors and maintenance men who are traveling the "MORE WORTHINGTON IN '41" non-stop highway to Greater Profit in '41!

Worthington Features that say "GO":

ROCK DRILLS AND AIR TOOLS

DESIGN: Skilled, scientific designing results in low air consumption, high rate of penetration—and a tool that is easy on the operator.

QUALITY: Forged steel throughout, precision-made parts, and highest skilled workmanship guarantee ruggedness, long life and low maintenance.

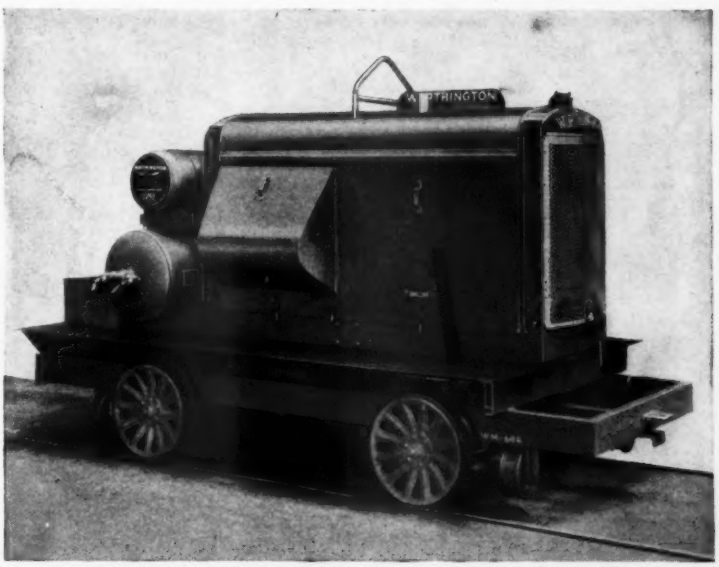
SPECIAL FEATURES: In certain Drifters and Hand-Held Drills such exclusive Features as Independent Rotation, Pneumatic Feed and Hole Spotters result in lower cost per foot of rock drilled.

PORTABLE AND SEMI-PORTABLE COMPRESSORS

Worthington Compressors are designed for heavy-duty, low-speed service resulting in maximum overall performance with long life and low maintenance cost. These benefits result from—

- TWO STAGE AIR COOLING
- FEATHER VALVE
- ARTICULATED CONNECTING ROD
- FORCE FEED LUBRICATION
- ENCLOSED CLUTCH
- SEALED CRANK CASE
- UNIT ASSEMBLY
- SIX-CYLINDER ENGINE
- SECTIONALIZED RADIATOR AND INTERCOOLER
- STRUCTURAL STEEL ALL-WELDED FRAME
- ROLLER BEARING WHEELS

There is a Worthington Distributor or Branch Office in your area that will give you prompt local service.



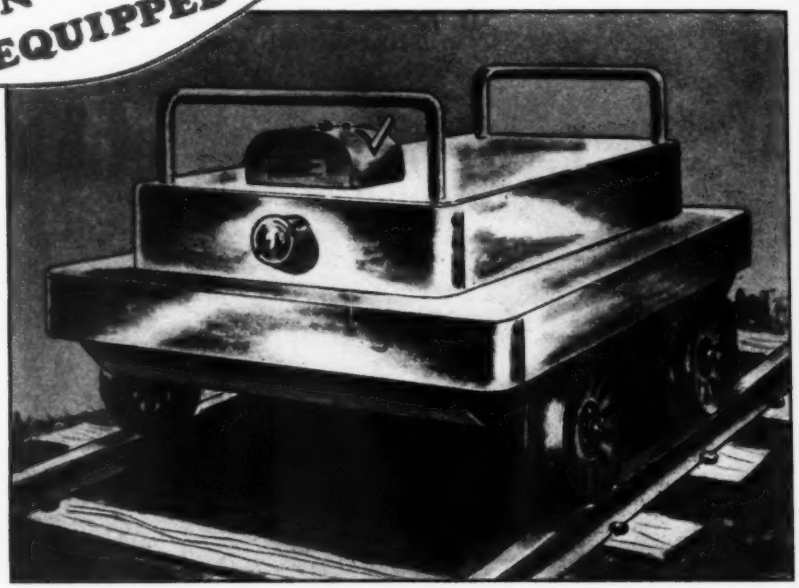
The Worthington Rail Car has proved its worth to railway maintenance men throughout the country. It is furnished in all sizes, for railroad, inter-urban and suburban track work—non-self-propelled or self-propelled.

WORTHINGTON

WORTHINGTON PUMP AND MACHINERY CORPORATION, HARRISON, N. J.

HOLYOKE COMPRESSOR AND AIR TOOL DEPARTMENT
HOLYOKE, MASSACHUSETTS

RD1-1A



ALWAYS READY FOR ACTION

Section motor cars and trailers equipped with TIMKEN Tapered Roller Bearings are faster and more dependable; require less attention for lubrication; last longer; cost less for maintenance. They are as superior to ordinary friction bearing cars as are modern Timken Bearing Equipped streamlined trains to friction bearing trains.

Specify "Timken Bearing Equipped" when buying new section cars—be prepared for any emergency. Most leading section car manufacturers use TIMKEN Bearings.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN
TAPERED ROLLER BEARINGS

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; and TIMKEN Rock Bits.

Don't be caught napping..

by Shortage of Track Materials

APPLY MECO LUBRICATORS

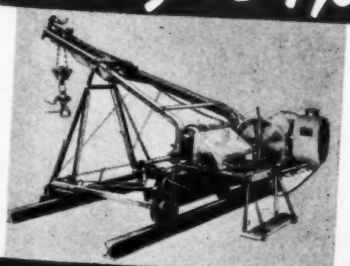
—to greatly prolong the life of curve rails and ties. They reduce nosing and friction wear, make high speeds safe—increase tonnage ratings where curvature is the governing factor.

Over 4000 Mecos in Use

APPLY MACK SWITCH POINT PROTECTORS

—to protect switch rails and make switch rails last 10 times longer. *Reversible*—when the Mack wears down, its initial efficiency is completely restored by simply re-applying it upside down.

Nearly 134,000 Macks have been used



USE THE POWER RAIL LAYER

—to cut the cost of rail handling. Costs less to buy—less to operate—requires no train orders—easily pushed along the track by its operating crew.

Visit us at Booths 62 & 63 during the March Convention

MAINTENANCE EQUIPMENT COMPANY

RAILWAY EXCHANGE BUILDING CHICAGO, ILLINOIS

TO RAILWAY SUPPLY MANUFACTURERS

"When He Can't Make Deliveries"

"Boss, I met Bill Smith of the X..... Company yesterday and he told me that he's going to Florida for a couple of months—said his company couldn't make deliveries before June and he wasn't going to waste his time calling on railway officers now," said the star railway salesman to his sales manager.

"He's foolish, Bill. That's a shortsighted sales policy," replied his sales manager.

"Why? He can't promise any deliveries within this time."

"Perhaps not. Neither can we. But it's your job and mine to see that our friends understand why we can't and convince them that we'll take care of them at the first opportunity."

"But that'll only make them sore."

"Not if we give them the facts. They're reasonable men who recognize that we're preparing for war. They'll appreciate this consideration from you and me, especially when they know we're not looking for orders."

"I guess that's right. I hadn't thought of it that way."

"It's the business-like way, Bill. You know we'll want their business when this period blows over."

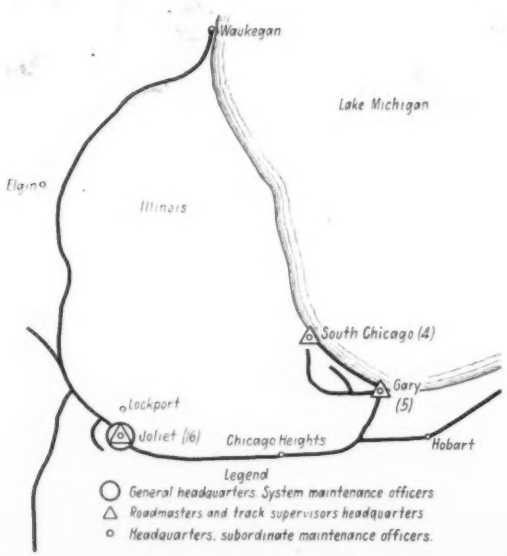
"I'll say we will. I haven't forgotten the last 10 years."

"And what's more, Bill, you can use these calls as an opportunity to drive home the reasons why our material is better so they'll want it all the more. It'll help keep them sold until we can make deliveries. You know it's human nature to want something all the more when you find you can't get it."

"Boss, you're smart. This *is* no time to quit. I'm going to keep closer in touch with my prospects than ever before."

"That's right. And that's the reason we're going to continue our advertising in *Railway Engineering and Maintenance*. It's even more important to keep our material before our friends when we can't make deliveries, so they won't forget us."

"That's great. With the story of the superiority of our equipment before them in that magazine every month (and they all read it) and with my calls, we won't allow them to forget *us*."

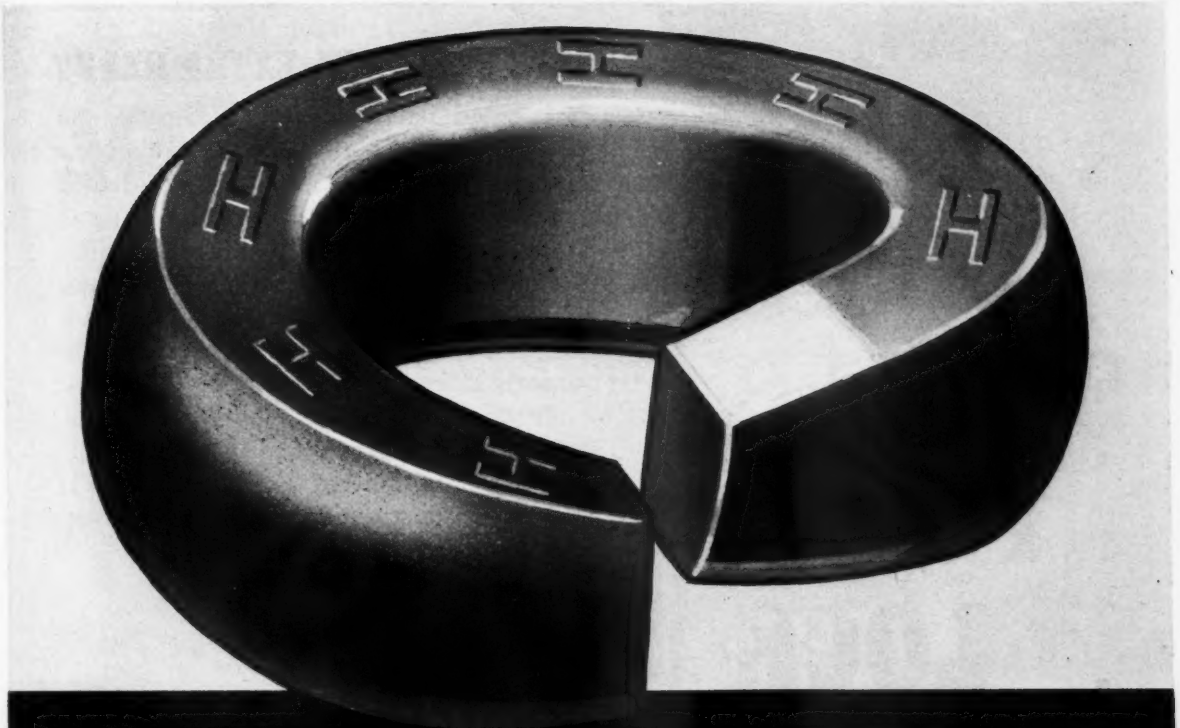


★

Railway Engineering and Maintenance Goes Every Month to **10 Supervisory Maintenance Officers** of the Elgin, Joliet & Eastern at the General Offices and 3 Subdivision Headquarters. This Magazine Goes Also to 23 Other Subordinate Officers Who Are in Training for Promotion to Supervisory Positions on This Railroad.

★

RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS



WITH SPRING WASHERS
It's Reactive Power That Counts

. . . and The Hubbard SUPER-SERVICE Gives Most For the Money

Hubbard SUPER-SERVICE Alloy Spring Washers deliver 121 per cent more reactive protection than spring washers to A. R. E. A. Specifications. You get this extra rail and joint saving protection for a fractional increase in cost per washer but at a lower cost per pound of reaction.

Exhaustive tests have proved that joints bolted with Hubbard SUPER-SERVICE Alloy Spring Washers were not solid or frozen with a bolt tension of 30,000 lbs. Hubbard's SUPER-SERVICE do not go flat at 60,000 lbs. proving that their high reactive power is still working—still effective. As a result of this continuous cushioning protection—wear between rail and joint bars is reduced—rail batter is minimized to the extent that rail and joint bar wear is reduced 80 per cent.

Convince yourself with a trial application on your high speed main line track—crossings—frogs and switches. We will be glad to send a personal representative upon request.

Hubbard and Company
TOOL DEPARTMENT
CHICAGO • PITTSBURGH • NEW YORK

New

RACOR SWITCH POINT LOCK

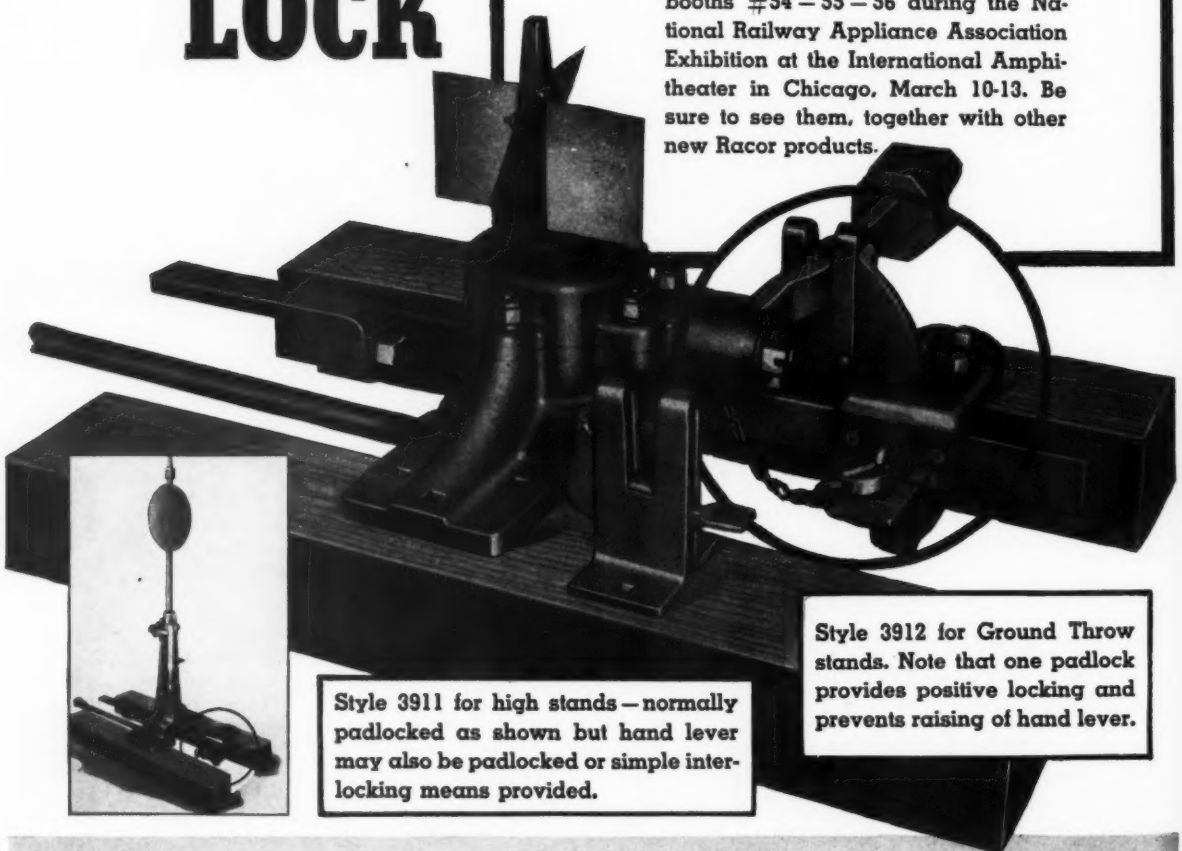
SAFE—COMPACT—EXTRA HEAVY

Located below the top of the tie, the mechanism of the new Racor Switch Lock is entirely separate from the stand and completely protected. Even if the stand is knocked down, the lock will still function.

Furthermore, the locking rod clamps directly to the switch point and the padlock cannot be inserted unless the switch is properly closed.

These two features, together with the extra-heavy construction, provide complete protection for the switch against failure or even destruction of any part of the switch stand or its connections.

These locks will be displayed in our booths #54 — 55 — 56 during the National Railway Appliance Association Exhibition at the International Amphitheater in Chicago, March 10-13. Be sure to see them, together with other new Racor products.



Style 3911 for high stands — normally padlocked as shown but hand lever may also be padlocked or simple interlocking means provided.

Style 3912 for Ground Throw stands. Note that one padlock provides positive locking and prevents raising of hand lever.

RACOR **RAMAPO AJAX DIVISION**

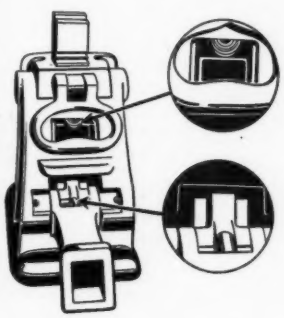
THE AMERICAN BRAKE SHOE & FOUNDRY CO. • 230 Park Ave., New York

JOYCE
again in the SPOTLIGHT

When Jack is lifted by carrying handle, it tilts just enough to permit base to slip easily under rail while lift bar hangs in the clear.

With a New Series of TRACK JACKS

20 TONS CAPACITY



Two new 20-ton Joyce Track Jacks are a highlight of the National Railway Appliances Show.

Track Jacks of 20 tons capacity are an innovation to provide easier lifting for the operator.

FEATURES: Single-acting, with coiled springs actuating both lifting and retaining pawls. Lifting pawl coil spring is entirely protected and concealed within lever trunnion.

Long, gently sloping nose on base of Jack slips easily under rail when operator swings Jack by carrying handle. Foot of lift bar clears both underside of rail and surface of ballast.

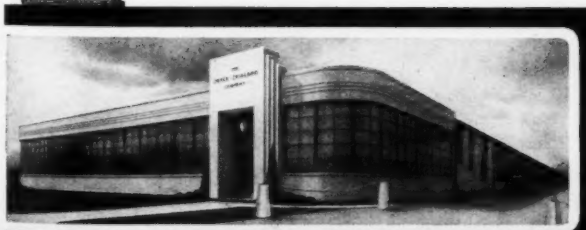
There are longer and larger finger pins for speed and safety in lowering Jack. Lever sockets are square to accommodate track lining bars. New style carrying handle provides ample clearance between lever and handle—no finger pinching.

Note position of two pawl springs, which keep pawls snugly engaged with lift bar regardless of position of Jack.

THE JOYCE-CRIDLAND CO., DAYTON, OHIO

Huston Brown, V.P. & Gen. Sales Mgr.

C. N. Thulin, Manager Railway Sales
Suite 1118, 122 S. Michigan Ave., Chicago.



JOYCE JACKS

1000 gallons for 8/10¢ on the ILLINOIS CENTRAL

...G-E VERTICAL HOLLOW-SHAFT INDUCTION MOTORS furnish this low-cost power with minimum trouble and maintenance

AT GWIN, MISS., Illinois Central is pumping water from wells 400 ft deep, using two 150-gpm Layne turbine pumps. Each pump is driven by a G-E 5-hp vertical, hollow-shaft, weatherproof 1750-rpm motor. Pump settings are 30 ft from the surface.

These pumps are producing 7,000,000 gallons of water monthly at an average consumption of .316 kw-hr per 1000 gallons. Power cost at 2.5¢ per kw-hr is $0.0079 per 1000 gallons—real proof of electric-drive economy.

Economical performance is one big reason behind I.C.'s O.K. on electric drive. This road has electric-pump installations in 53 water stations, of which 27 are supplied by deep-well systems. A total of more than 160 electric motors are helping its fast trains keep their water-service time to the minimum.

Note these Money-saving Features

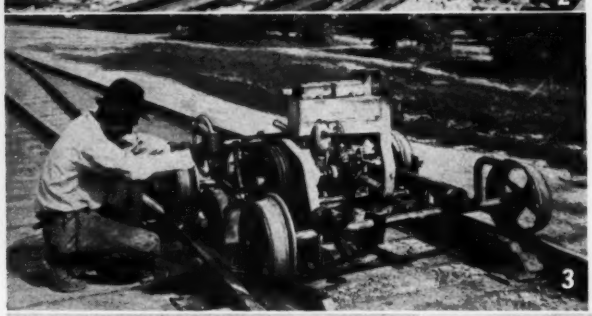
- ✓ The installed cost is less than ½ that of comparable steam or oil installations.
- ✓ Automatic and remote controls require little attention, free water-service men for other duties.
- ✓ The quick, easy availability of this motor's parts reduces inspection and maintenance costs.
- ✓ This electric motor's suitability for outdoor installations can reduce first cost and maintenance expense.

Consult your G-E representative about this modern drive for pumping stations. He will welcome an opportunity to explain how these G-E motors can save you money and assure reliable service, just as they are doing for an ever-increasing number of American railroads. General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

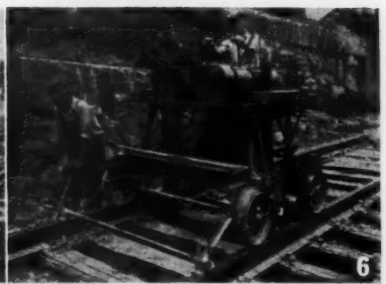
127-3

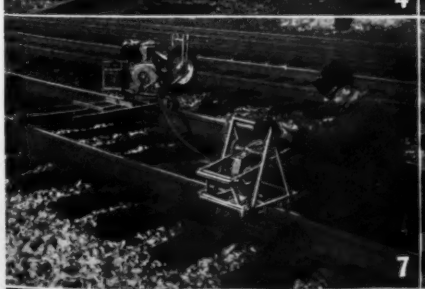
NINE Nordberg Power Tools are ready to serve you



Each tool of this Nordberg Line was developed to meet the specific needs of track maintenance in doing such jobs as laying rail, ballasting, joint maintenance, grinding of reconditioned rail, switchpoints, crossings, etc., and also for shifting and raising track. These tools were developed to help you do a better job of maintaining track, doing it in less time and at lower cost. See them and some new developments on display for the first time in our space at the National Railway Appliance Exposition at Chicago, March 10th to 13th.

1. **Adzing Machine**
2. **Spike Puller**
3. **Surface Grinder**
4. **Precision Grinder**
5. **Power Wrench**
6. **Power Jack**
7. **Utility Grinder**
8. **Rail Drill**
9. **Track Shifter**





NORDBERG MFG. CO. MILWAUKEE WISCONSIN

Export Representative—WONHAM Inc.—44 Whitehall St., New York

SEE IT IN BOOTHS 73-74

Be sure to see the latest CP Compressor for track maintenance . . . the new CP 4-tool unit for spot tamping . . . self-contained . . . completely air-cooled, both engine and compressor . . . 60 c.f.m. capacity, 100 pounds pressure.

If you do not get to the Railway Show, write for complete data on this new CP Compressor and other Maintenance of Way equipment.

ALSO ON DISPLAY IN BOOTHS 73-74
NATIONAL RAILWAY APPLIANCES ASSOCIATION
CHICAGO · MARCH 10th TO 13th

the following CP equipment for better, lower cost track maintenance

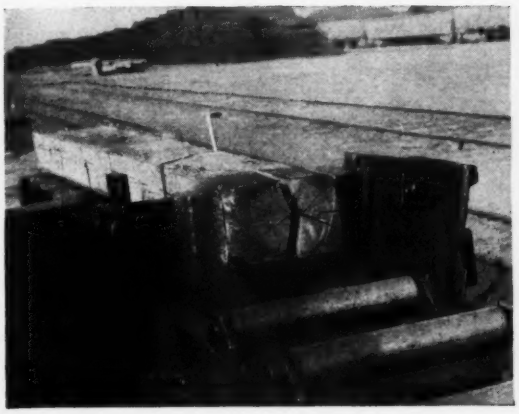
GASOLINE TIE TAMPER
CUT SPIKE DRIVERS
"POWER VANE" REVERSIBLE WRENCHES
CONCRETE VIBRATORS
ROTARY SCREW SPIKE DRIVERS
UNIVERSAL ELECTRIC NUT RUNNERS
4-TOOL "HICYCLE" ELECTRIC TIE TAMPING UNIT
PNEUMATIC TIE TAMPERS

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 6 EAST 44th STREET, NEW YORK, N. Y.
SALES OFFICES AND SERVICE STATIONS THROUGHOUT THE WORLD

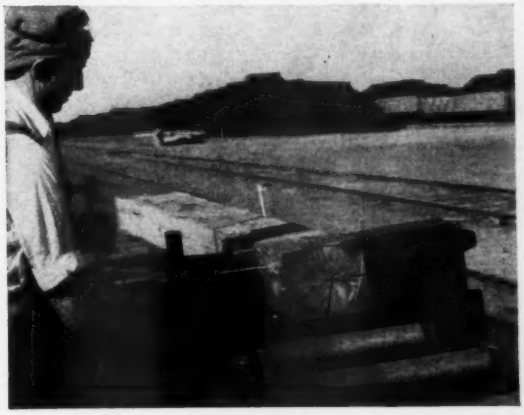
CP EQUIPMENT
FOR MAINTENANCE OF WAY

BIG SAVINGS

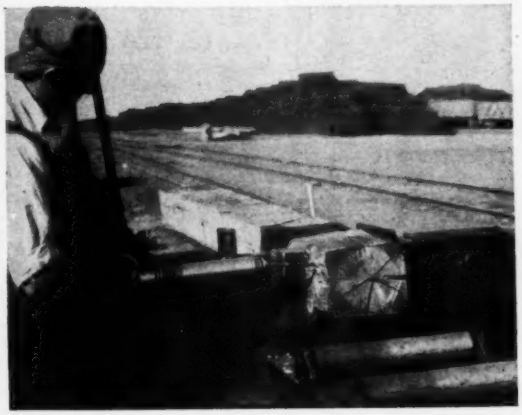
NO RAILROAD MAN CAN AFFORD TO IGNORE THE OBVIOUS ECONOMY OF THE GIANT DOWEL



1 Here the badly split tie is placed in the "Squeezer" where it will be pulled together tightly.



2 Now the tie has been pulled together under pressure and the holes are being bored for the dowels.



3 Here the Dowel is being driven into the pre-bored holes—every dowel grips and holds tight.

4 The "Squeezer" is released and the tie is in prime condition ready for a lifetime of service.

Write today for full information

GIANT REINFORCING DRIVE DOWELS

PITTSBURGH
SCREW AND BOLT CORPORATION
PITTSBURGH, PA.

GARY
SCREW AND BOLT COMPANY
GARY, IND.—CHICAGO, ILL.

American Equipment Corp. . . . . Norristown, Pa.

DISTRICT OFFICES: International Building, New York, N. Y. . . . General Motors Building, Detroit, Michigan . . . . N. B. C. Building, Cleveland, Ohio . . . Post Office Box 222, Savannah, Georgia . . . . Republic Bank Building, Dallas, Texas

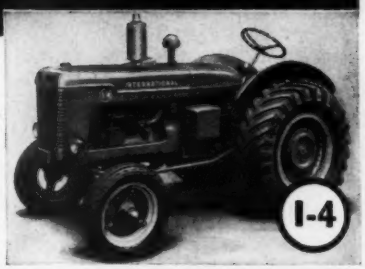
FLEX-TOE *Will Reduce Your Maintenance Costs* FOR 6 REASONS···

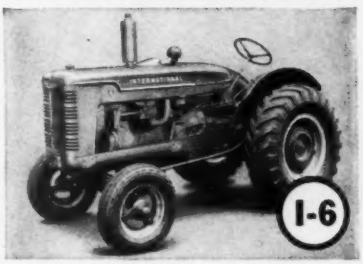
1. *A One-Man Claw Bar—no helper is necessary.*
2. *Two men with Flex-Toe Bars can do as much work as three with ordinary bars.*
3. *Pulls headless spikes and drift bolts quickly.*
4. *Saves ties.*
5. *No driving with spike maul—eliminates personal injury hazard.*
6. *No shop redressing.*

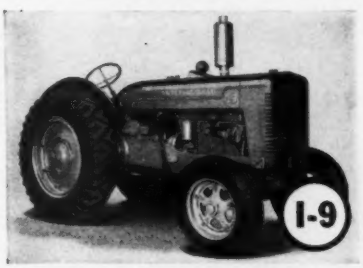
FLEX-TOE is rapidly becoming recognized as the claw bar which every track gang needs for greater speed and safety. It also pulls everything—headless spikes, as well as ordinary spikes, drift bolts, and boat spikes. Workmen throw the bar on its object in the conventional manner. Movable toes grab hold tightly when leverage is applied to the handle, and by manipulating it just as an ordinary claw bar, the spike or bolt comes out. Spike pulling becomes easier and there's nothing new to learn. Flex-Toe will reduce your costs just as it has for others. There's no other way to equal Flex-Toe's efficient and low cost performance. Write today for literature and prices.

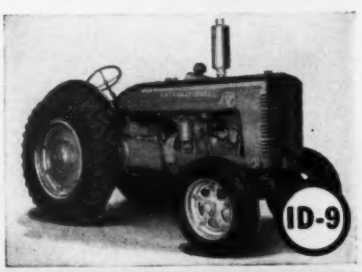
WARREN TOOL CORPORATION
WARREN, OHIO

5 NEW INTERNATIONAL Industrial WHEEL Tractors









• Here are International Harvester's latest products for the men who use industrial power—five *brand-new* International Industrial WHEEL Tractors. These "I" Tractors, added to the line of International TracTracTors and Power Units announced in 1940, make *standardization* on International Industrial Power *more profitable than ever.*

Three of these new "I" models have carburetor-type engines—two have International quick, easy-starting, *full* Diesel engines. They are streamlined, efficient, economical—ready to cut costs to the bone on a wide variety of jobs.

Contractors, counties and townships, cities and villages, airports, parks, cemeteries, golf courses, railroads, public utilities, factories, lumber and building supply yards, etc., will find these new Internationals useful, handy, and economical on a wide variety of construction, maintenance, materials-handling, and transportation work.

All these tractors have Tocco-hardened crankshafts, pressure lubrication, replaceable cylinders, five forward speeds up to 15 m.p.h., gear drive, countershaft brakes that can be individually controlled or interlocked, provision for mounting a variety of allied equipment, and many other features.

See these tractors at first hand. Watch them perform on the job. Ask the nearest International Industrial Power dealer or Company-owned branch for full information.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue, Chicago, Illinois

"I" Tractor Facts

I-4—4-cylinder valve-in-head gasoline engine. Bore and stroke 3⅜ x 4¼ in. 5 forward speeds up to 15 m.p.h. Develops 29.5 engine h.p. at 1,650 r.p.m.
I-6—4-cylinder, valve-in-head gasoline engine. Bore and stroke 3⅞ x 5¼ in. 5 forward speeds up to 14 m.p.h. Develops 40.5 engine h.p. at 1,450 r.p.m.
ID-6 DIESEL—Quick-starting, 4-cylinder, compression-ignition, 4-cycle Diesel engine. Bore and stroke 3⅞ x 5¼ in. 5 forward speeds up to 14 m.p.h. Develops 38.5 engine h.p. at 1,450 r.p.m.
I-9—4-cylinder, valve-in-head gasoline engine. Bore and stroke 4.4 x 5.5 in. 5 forward speeds up to 15 m.p.h. Develops 54 engine h.p. at 1,500 r.p.m.
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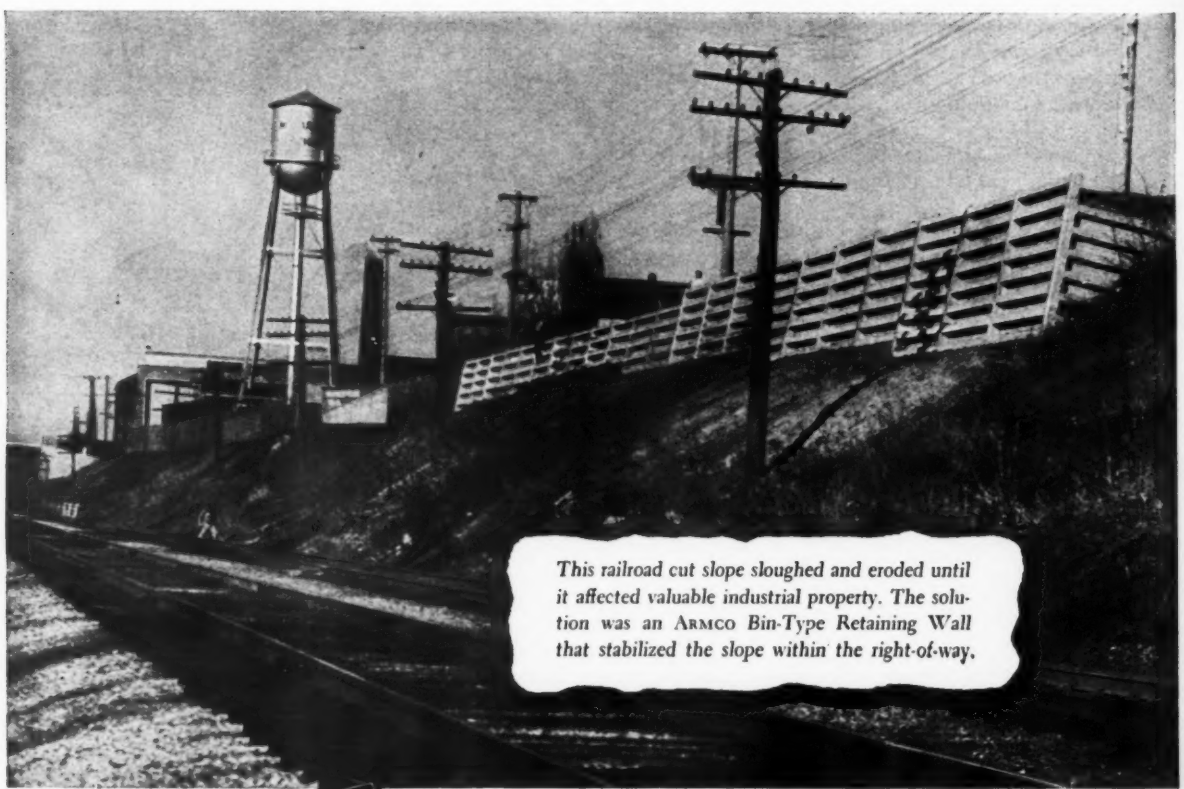

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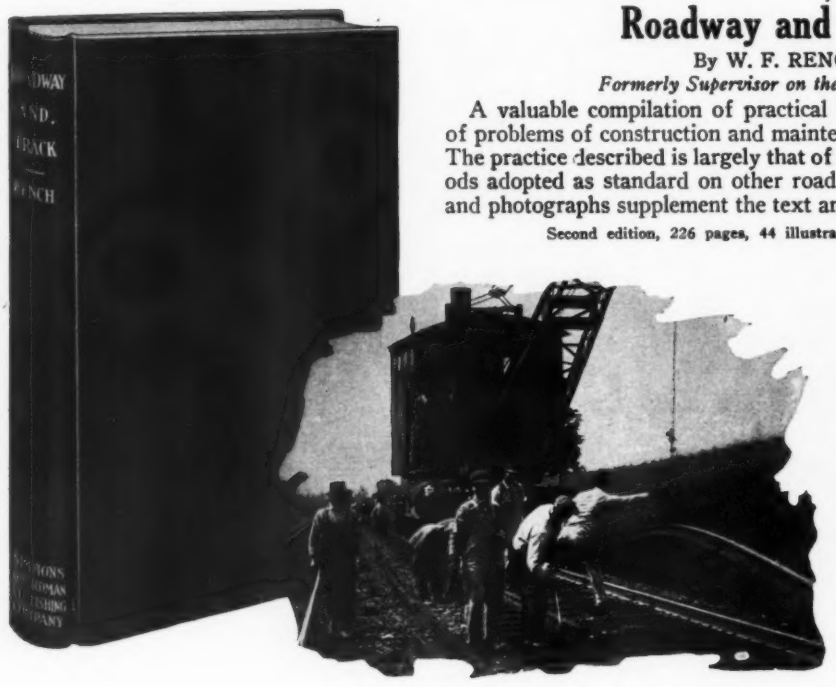

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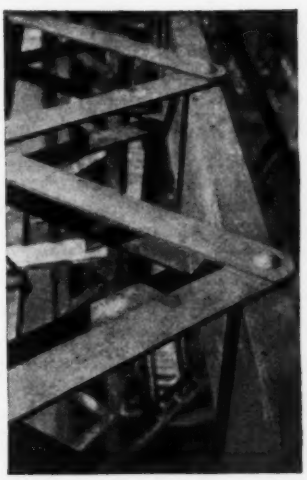

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March 1, 1941

Subject: Advertisements

Dear Reader:

In the many letters that I receive from you in which you tell me of the help that you gain from Railway Engineering and Maintenance, I have been struck of late with the increasing frequency with which you are referring to our advertising pages. This impresses me as significant for several reasons.

In the first place, these comments show that you are alert to learn of new materials and equipment, as well as to be reminded of older products that will aid you in the prosecution of your work. This is a highly encouraging commentary on the progress of maintenance methods that is yet to come.

Your increasing use of the advertising pages testifies also to the fact that you are finding in these pages information that is of interest and help to you. This in turn shows that our advertisers are including in their "copy" information of the kind that you are seeking – the objective of advertising.

I wonder if you realize how much this regular reading of our advertising pages saves your time (and that of the salesmen too) by familiarizing you with the various materials and products so that you can "get down to brass tacks" at once when the salesmen call on you – a not unimportant consideration for everyone concerned in this year of greatly increased activity.

As the editor of Railway Engineering and Maintenance, I have never been able to develop much sympathy for the manufacturer who contends that his advertisements are not read, for such statements always impress me as either incorrect or an admission that the advertisements have been so poorly prepared as to fail to interest you. In these days of active competition for the reader's attention, every page, editorial and advertising alike, must strive to enlist your interest.

The fact that so many of you are writing me of your increasing interest in our advertising pages reflects credit on our advertisers and on those who prepare their "copy". We believe that you will find the advertisements in this issue particularly informative and helpful as you are completing your working programs for this year.

Yours sincerely,

Elmer T. Howson

ETH:EW

Editor

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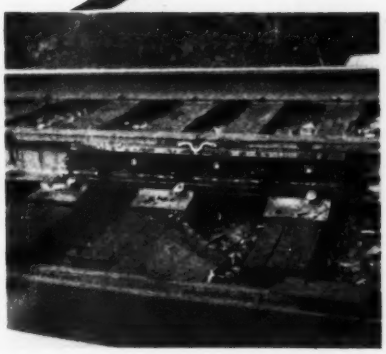
Joint bars are applied in regular manner. Bolt threads are thoroughly coated with lubricant as the bolts are pushed through and taken up.



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These savings can be your savings. Why not begin getting them now by including R.M.C. Plastic in your spring maintenance program? Ask your Rail Joint Company representative or write

RAILWAY MAINTENANCE CORP.
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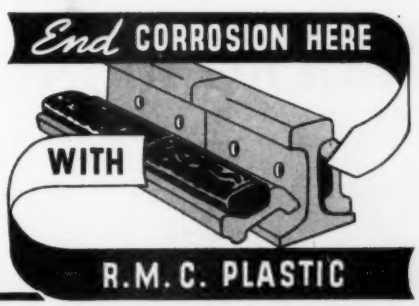
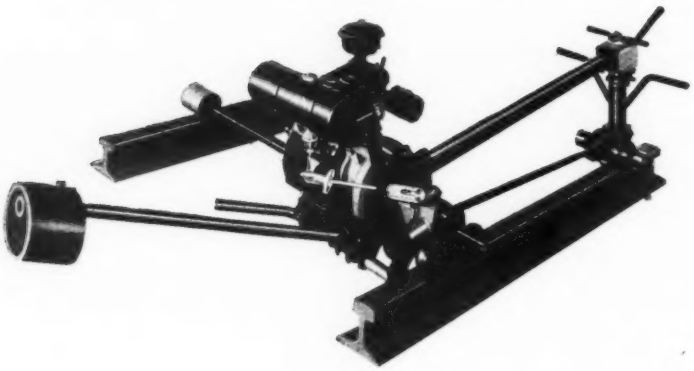


Raco Power Track Machine



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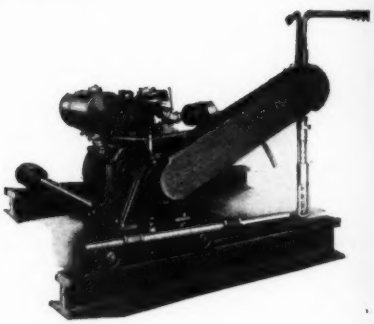
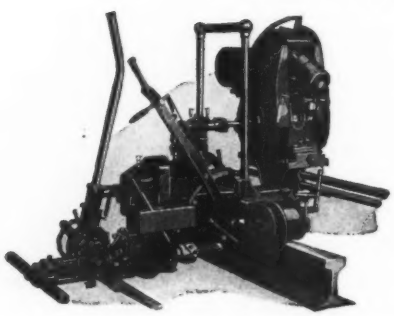


Everett Power M-W Machine



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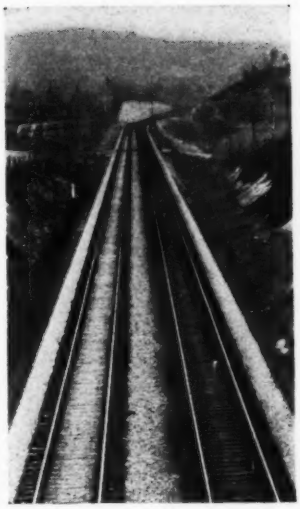

Published on the first day of each month by the

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105 West Adams Street, Chicago

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Railway Engineering and Maintenance

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MARCH, 1941

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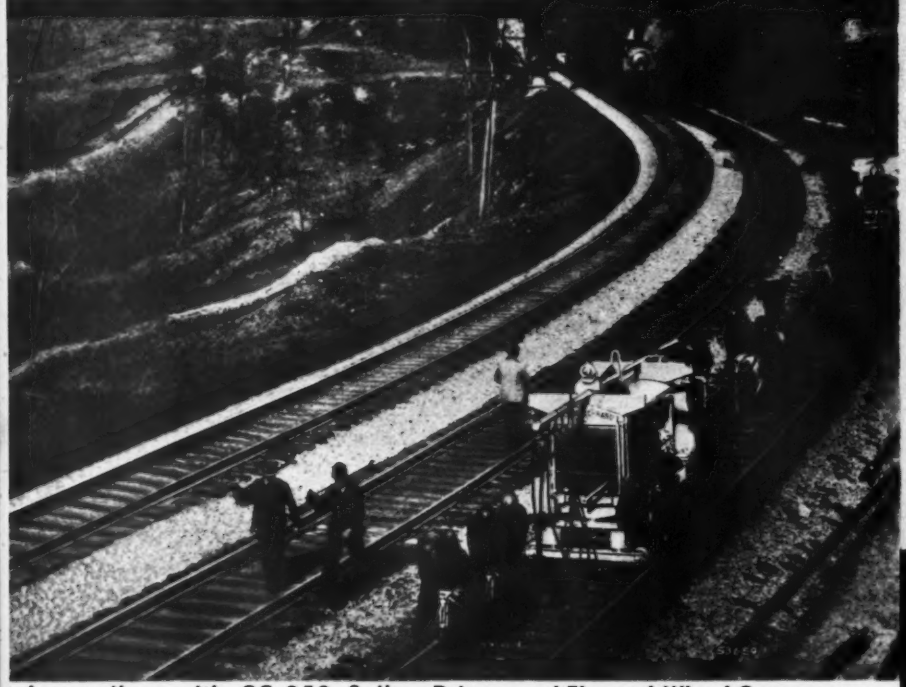

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Railway Engineering and Maintenance

War

The Railways Face the Task

AT the present time when preparations for war are uppermost in the public mind, the indispensability of the railways in a broad program of national defense comes to the fore. Regardless of the progress that has been made in the development of air, highway and water transportation, everyone recognizes that these agencies are at best only auxiliaries and that main dependence must still be placed on the railways.

Of Public Concern

It is only natural, therefore, that the public should be concerned over the ability of the railways to meet the demands that it anticipates will arise as the country becomes fully geared to military activities, especially when it recalls the paralysis of transportation that led the government to take over the operation of the railways shortly after our entrance into the last World War. It is of national importance, therefore, that every employee of the engineering and maintenance of way department, and every other railway employee, inform himself regarding the present railway situation and the ability of the railways to meet the demands that may arise in the present emergency in order that he may, in turn, disseminate this information among those with whom he comes in contact and thereby contribute to the enlightenment of the public on the adequacy of one of the important elements in national defense.

In our last issue we discussed the cause of the near-collapse of transportation service in 1917 and showed that it was due to the misuse, rather than any shortage, of railway facilities. We pointed out also the measures that have since been initiated to anticipate and eliminate the possibilities of a repetition of this experience. Since that editorial appeared, further information of a highly authoritative character has been made public in an address delivered on February 24 by Ralph Budd, president of the Chicago, Burlington & Quincy and a member of the Advisory Commission to the Council of National Defense in charge of transportation. This information is so authentic and so timely that it forms the basis for much that follows.

In considering the transportation facilities that are now available to us in war time, we face the tremendous development in other than rail facilities during the last two decades, as a result of which our total transportation plant now involves an investment of some 53 billion dollars, of which about 24 billion dollars is in railways; an equal amount in highways; 4 billion dollars in waterways; slightly less than 1 billion dollars in pipe lines; and about 200 million dollars in airways. This vast investment has created a transportation plant with capacity far in excess of current or anticipated needs.

From the standpoint of the railways, it is interesting further to note that approximately 62 per cent of the nation's freight traffic moves over the railways, 9 per cent over the highways, 14 per cent on the Great Lakes, 3 per cent on other inland waterways, 12 per cent through pipe lines and a fraction of 1 per cent of this traffic is carried by the airways.

Past Records

In attempting to determine the magnitude of the demands that will be made on the railways, it is well to consider previous high records and the relation of present traffic thereto. In passenger traffic, therefore, the maximum was reached in 1920, when it totaled approximately 47 billion passenger miles. By 1932, this figure had declined to 16-1/3 billion, while in 1940, it had recovered to nearly 24 billion. Even this figure, however, was only slightly more than half the business handled 20 years before.

In freight traffic, the trend has been similar although less pronounced. In 1926 and again in 1929, approximately 53 million carloads were handled. In 1932, the total was only slightly more than half this maximum, while in 1940, the railways handled only 36-1/3 million carloads, or only 68.5 per cent of their 1929 performance. This 1940 traffic was 2,442,000 carloads larger than that of the preceding year. Yet it was handled with complete absence of congestion or shortage of facilities.

What of 1941-42?

With this background, it is important to determine the amount of traffic that the railways are expected to handle in 1941 and 1942. Numerous estimates have been made. The most authoritative is that which has just been made by the Bureau of Research and Statistics of the Advisory Commission to the Council of National Defense and translated into terms of railway traffic by the Bureau of Railway Economics. This survey gives

consideration to the relative activities of various basic industries, such as iron ore, where the output for 1941 is placed at 91,000,000 short tons, by far the largest in history, while the activities in other industries will be reduced. As a result, the net *increase* in loadings from all sources in 1941 over 1940 is estimated as 9.4 per cent. Similarly, the net increase for 1942 over 1940 is fixed at 16.9 per cent. These figures are as follows:

Total Revenue Freight Carloadings

Calendar Year	Carloads	Increase over 1940 Carloads	Per Cent	Increase over 1941 Carloads	Per Cent
1940 (actual)	36,353,609	. .	. .	. .	. .
1941 (est.)	39,780,237	3,426,628	9.4	. .	. .
1942 (est.)	42,493,982	6,140,373	16.9	2,713,745	6.8

It is of interest in this connection also to note the average weekly carloadings in recent years, in comparison with those estimated for 1941 and 1942.

Year	Average Weekly Carloadings	Year	Average Weekly Carloadings
1926	1,021,131	1938	585,713
1929	1,015,922	1939	652,144
1932	541,922	1940	699,108
1936	694,406	1941 (est.)	765,000
1937	724,432	1942 (est.)	817,200

From the above, it is seen that 1940 carloadings were 68.5 per cent of those in 1926 and 1929, while the carloadings anticipated in 1941 will be 75 per cent of those for these record years and those for 1942, 81 per cent.

When it is considered that the railways have spent $9,500,000,000 for the improvement and enlargement of their plant since 1923 and the further fact that since September, 1939, they have placed in service 84,117 new freight cars and 620 new locomotives, while they have 54,557 more new cars and 238 more locomotives under construction, it should be evident that there is adequate basis for the confidence that railway managements hold that they are prepared to meet in full the needs of national defense and to measure up to the full requirements of the emergency.

The greatest service that railway men can render their industry, beyond that of doing their own work with maximum efficiency, is to see that those with whom they come in contact have the facts regarding the ability of the railways to meet the transportation problems of national defense. If those now in charge of the railway properties are permitted to devote their attention to the operation of these properties, the railways will meet the demands. They have the plant, the personnel, the experience; and they have the will to serve.

Floods

May Still Happen in Some Sections

IN those sections of the country where there is considerable snow on the ground, the stage is set for floods of varying magnitude, depending on the depth of the snow, the runoff gradients and the height to which the temperature rises. The prolonged period of low temperature that has affected almost all northern sections, and that only now seems to be passing, has prevented the slow melting of the snow cover and has thus increased the probability of an unusual amount of snow water when the temperature finally rises. In other words, the probability of floods has been increased by the lateness and length of the cold spell.

If preparation has not already been made to combat the damage that may be caused by a sudden and considerable rise in temperature, it should not be delayed. It is seldom possible to foretell even a few days in advance what the magnitude or the effect of a prospective flood will be, although experience has shown that some damage is almost inevitable unless ample preparation is made to prevent it. Nothing that can be done is more important than to insure that all channels are clear so that the flow will not be impeded. This will also minimize the danger of debris lodging against piers or the probability of blocked culverts. In many instances it is of equal importance that the channel be kept clear for some distance below bridges and culverts, particularly if there is much ice to go out with the flood waters.

Obviously, the fall of the year is the time to clear channels of drift, bars and ridges of sand and gravel and other forms of debris. Yet just as serious conditions are sometimes induced by deep accumulations of snow and ice, and there should be no failure to dispose of them before the water from the melting snow or the spring rains begins to flow. If this is done, much of the difficulty involved in handling the flood waters will be avoided and the probability of damage will be reduced.

Emergency Stocks

May Save More Than Own Value

WITH the continuing increase in railway traffic that is now occurring and the prospect that the greater activity in maintenance that was so evident last year will be continued in 1941, the question of emergency material stocks in large yards again comes to the fore. Competition in transportation is keener today than ever before, and the movement of freight by the railways is at a constantly increasing tempo. Freight train schedules between distant terminals have been or are being shortened relatively as much, and in numerous cases more than passenger schedules. Obviously, there will be little profit in speeding up the road movement of freight trains if all or any part of the time thus gained is lost in passing through yards. It follows, therefore, that yard delays are as indefensible as similar delays on the road.

A foreman in a busy yard cannot well be blamed for failure to keep his tracks in first-class condition, unless he is given the material and labor necessary to maintain them to the desired standard. Neither can he be blamed for delays that occur when a frog breaks, a switch is torn out by dragging equipment or a guard rail is damaged so badly that it can no longer be used, unless he has been provided with a stock of material upon which he can draw to make the necessary replacement. In not a few cases the delay incident to obtaining material that is not readily available will far outweigh in cost the value of the material that is needed to make the replacement.

Materials kept on hand for yard use should be separated into two categories—those for routine and those for emergency use. Regardless of the provisions for

storing the former, the latter should be so placed that they can be sent to any point in the yard in minimum time. Every man in the gang, whose duties include participation in the loading and delivery of materials in the yard, should be enjoined strictly never to draw on the emergency stock except in a clearly defined emergency, and arrangements should be made for the immediate replacement of any item that it becomes necessary to remove from this stock.

In general, an emergency stock for yard use should include only switch points, stock rails, frogs, guard rails, switch stands and connecting rods. The number of each item to be carried will depend on the size of the yard, the number of rail sections in service, the proximity to a storehouse stock and to some extent the volume and character of the traffic that is to be protected. In addition to the items already mentioned, it is sometimes desirable to include rails, joint bars, bolts, spikes, spring washers and tie plugs, although these should usually be contained in the stock for current use.

In determining the stock for emergency purposes it should never be lost sight of that emergency requirements may be costly if they cannot be met, or that a stock in excess of actual needs is a liability rather than an asset. It should also be kept in mind that the normal turnover of emergency materials is slow, for which reason it may be desirable to shorten the interval by occasionally interchanging emergency materials with routine stock.

Work Equipment

The Key to the Strenuous Days Ahead

THE enlarged programs of construction and maintenance which confront the railways in the months immediately ahead present railway engineering and maintenance officers with a challenge that they have not faced for years. With passenger and freight train speeds being stepped up to meet present-day demands, and with traffic increasing under the influence of huge government rearmament projects, British war purchases and improved business conditions generally, the problem which confronts these men is one not alone of carrying out a largely increased volume of work, but also of doing this work to higher standards than ever before, with less interference with train operation, and at lower overall cost.

To meet this situation successfully will be difficult, but that it will be met will be questioned by few. Many factors will combine to this end, including greater initiative on the part of railway men, more careful planning of work operations and the more efficient organization of forces, but, unquestionably, the most outstanding and telling contribution to the greater production and increased economy that will be demanded will lie in the more extensive and intensive use of work equipment.

The use of such equipment is not new to the engineering and maintenance forces of the railways. From 1920 to 1930, with the extensive improvements in railway facilities that were inaugurated in those years, there was widespread development of equipment designed for maintenance of way and structures work and large acceptance of this equipment by the railways. Since 1930, this development in equipment and its increased use have continued, stimulated by the demand for maximum economy, and the year 1940 witnessed the largest expenditures for such equipment on record, amounting to approximately $7,250,000. However, large as these purchases have been in the past, and progressive as some roads have been in their methods, it is a fact that no road today has all of the equipment that it could use to carry out its work most expeditiously and economically, and that there are many roads that, relatively speaking, have little or no equipment. Furthermore, more than 50 per cent of the work equipment now being used by maintenance of way forces is obsolete, in the light of the greater efficiency and overall economy available in the latest designs.

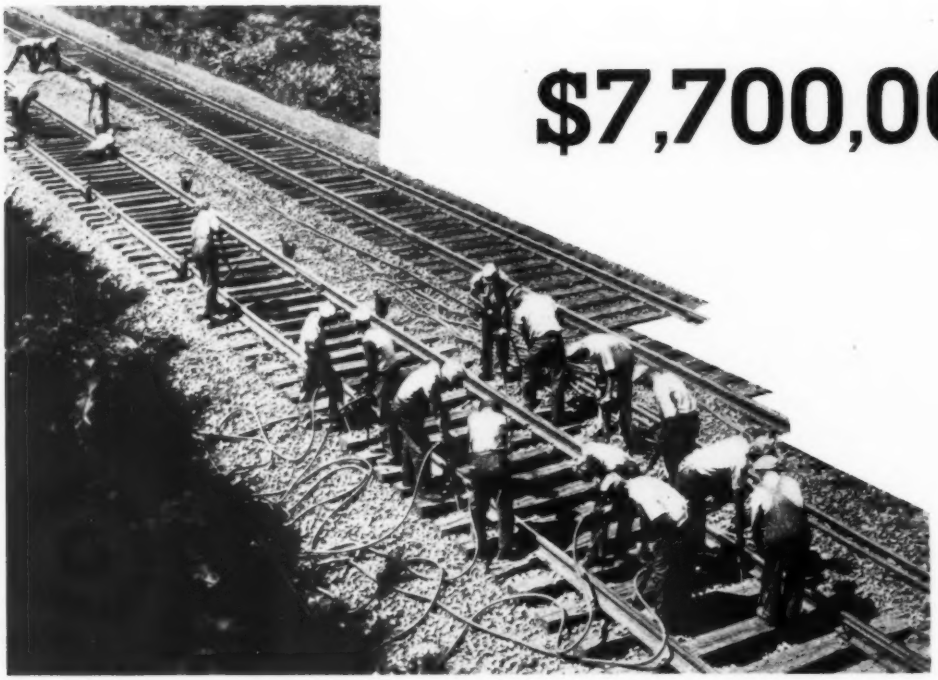
This is not a healthy situation, especially in view of the large work programs that now confront the railways. To some extent it will be remedied during the months immediately ahead as indications are, as pointed out in the first article in this issue, that the railways will spend $7,700,000 for work equipment in 1941, or approximately 6½ per cent more than in 1940, and the largest amount for any year to date. From the standpoint of maximum results and greatest efficiency, this should be highly encouraging, but the fact that there are many roads that are at present poorly equipped and that contemplate only minor purchases of equipment in 1941, is an indication that maintenance of way operations, improved as they will be, will still fall short of the goal of maximum efficiency and economy.

Unfortunately, some managements, and even some maintenance officers, are imbued with the idea that their roads are too poor to afford the equipment that many other roads consider essential to the economical performance of their work, or that they cannot afford to turn in obsolete equipment, so long as it holds together and will function at all. To these men, those with the greatest experience with power tools and work equipment will answer that it is those very roads that can least afford not to have adequate work equipment, or can least afford to operate obsolete equipment, for in both cases they are losing the large savings that are possible through modern machines, and, are in effect, continuing to pay for such equipment in higher work costs, some times several times over, without getting it.

That the purchase and use of work equipment entails added responsibilities for maintenance men all the way down the line, must be fully recognized. But the further fact that the successful discharge of these added responsibilities pays handsome dividends is brought out clearly in articles in this issue. To cite only one example, the experience of the Denver & Rio Grande Western, as pointed out in the paper on "Getting the Most Out of Work Equipment," by A. E. Perlman, engineer maintenance of way of that road, shows that through the expenditure of $85,000 for work equipment four years ago, largely of off-track types, this road saved nearly $300,000 in work-train expense alone in 1940 over 1937, while completing a substantially larger program of work.

If 1941 proves to be the strenuous year in construction and maintenance that all signs indicate it will be, it is certain that only through the extensive and intelligent use of work equipment, as on the D. & R. G. W., will the goal of maximum production, minimum interference with traffic, and overall efficiency be attained.

$7,700,000 for



Power Equipment For Surfacing Track Will Figure Largely in 1941 Purchases

FOLLOWING a year of record-breaking purchases of work equipment, during which the railways spent $7,250,000 for 5,414 power machines, power tools and other mechanical aids to maintenance, and despite the fact that these purchases followed five years of relatively heavy buying, in 1941 the railways of the United States and Canada will spend $7,700,000, or $450,000 (6.5 per cent) more than in 1940, for 4,700 power machines and tools and 1,000 other units. The fact that the increase in the number of units to be purchased, 5 per cent, is less than the increase in expenditures indicates rather definitely that while there will be no reduction in the number of the smaller units of equipment purchased, there will be an increase in the number of the larger and more expensive machines.

These statements are based upon information obtained from 37 of 49 roads questioned concerning the equipment they expect to buy this year. It includes fairly complete and detailed information regarding the plans of 21 roads comprising more than 40 per cent of the mileage of the country. While a few other roads have not completed their budgets, some of them indicated that they are expecting to spend as much or more than they did last year. Still other roads that did not list the units they expect to purchase advised that they would duplicate last year's purchases or would increase them slightly; and a few roads reported only the amounts set up for work equipment in budgets that have already been approved or are still under consideration. A few roads indicated that if earnings continue to improve they may make even larger purchases. Only three roads indicated that they do not expect to purchase any work equipment this year.

Confirming the indications that more of the larger and more expensive machines will be purchased in 1941, although several roads advised that in view of the large purchases they made last year they do not expect to buy so many units this year, a number of these roads indicated that their expenditures will be larger than they were last year. In fact, one road that has budgeted less than half the number of units it purchased in 1940, stated that its expenditures will be twice as large.

What the Budgets Show

Both the record-breaking number of units that were purchased in 1940 and the still larger number included in the budgets for 1941, indicate quite clearly that both maintenance and managerial officers are recognizing the economic value of power machines and tools for maintenance operations more fully than ever before. Some of these officers say frankly that they are prepared to mechanize their forces as rapidly as earnings will permit.

In the belief that information concerning the latest trends in the use of work equipment, with respect to both the volume of purchases and the types of equipment to be purchased, is not only of wide interest but will be useful to maintenance officers, the chief engineers and engineers maintenance of way of these 49 roads were asked what units of work equipment they expect to purchase during 1941. The 21 roads that gave us detailed information, reported that they have already completed budgets calling for 2,179 units, representing 77 types, not including small tools for bridge and building work, for, in addition to specific types, a number of officers added from one to a half-dozen "complete outfits of small power tools for bridge and building work, including generators." These figures do not include three roads that gave only the monetary totals for their budgets. Obviously, the purchases of these three roads, totaling more than $800,000 will increase the foregoing figures materially.

The lists of equipment given by the individual roads cover a wide range of both types and sizes, for an equally wide range of maintenance operations, from ditcher-spreaders, locomotive and other cranes, motor trucks, dump cars, dump trucks, tractors and tractors with auxiliary equipment for moving earth, power shovels, draglines and ballast-cleaning machines, to small power-driven hand tools, such as riveting hammers, clay diggers, saws, power wrenches, tools for cleaning structural steel, etc. The 77 individual types that were included in the

Work Equipment in 1941

Budgets Indicate Peak Year in Purchases, Exceeding Those of Last Year by $450,000, or About 6½ Per Cent

budgets for 1941, cover requirements for laying and maintaining rail, handling material, cleaning ballast, renewing ties, surfacing track, destroying weeds, ditching, grading, transporting men and materials, paving, mixing and depositing concrete, maintaining steel and timber bridges and buildings, and for numerous other operations. It can be expected with considerable certainty that more types of equipment than the 77 that were listed will be purchased, for it is the common experience that even where buying is restricted, more types are purchased than are listed in the budgets, and when purchases are being made more freely, the number of types actually purchased may be as much as 60 per cent greater than was contemplated originally.

Machines for Laying Rail

It is generally recognized that the amount of rail that is laid in any year provides a reliable index to maintenance activities as a whole. It is of interest, therefore, that although most roads are better equipped with power machines for laying rail than for any other individual operation in maintenance, and despite the large amount of this equipment that they purchased last year, the work equipment budgets for the current year include more than 400 power machines for laying and surfacing rail and for maintaining it later. These machines include spike pullers, spike drivers, bolt tighteners, adzing machines, rail cranes, rail and bonding drills, surface and cross grinders, welding and heat-treating equipment, power jacks, power ballasters, tie-tamping outfits, tie cutters and rail benders. This year, several new types of equipment for use when surfacing track or renewing ties, such as tie nippers and tie pullers, have appeared on the market and it is to be expected that some of them will be included in the purchases for the year.

Drainage has long been recognized as fundamental for the stabilization of roadbed and track, but it has required the recently inaugurated high-speed schedules for both freight and passenger trains to emphasize its importance and place it in the rank it deserves. During the last 10 years such ditching equipment as was on hand at the beginning of the depression has been used intensively, many of the machines having been kept in service long after they would have been retired under normal conditions. As a result, although a relatively few units of ditching equipment have been purchased as replacements, and in some cases as additions, much of the equipment that has been employed in this service is now worn out and obsolete and warrants replacement.

A somewhat similar situation exists with respect to other earth-moving equipment, with the exception that only the most necessary grading has been done for more than a decade, and there is a present need for a wide range of grading work that will employ almost all of the types of such equipment that are available. A survey of the budgets indicate that the railways are aware of this need and desire to overcome the shortage, so far as practicable, without unbalancing their work-equipment purchases. In partial satisfaction of this need, therefore, in 1941, the railways will purchase not less than 153 units of earth-moving equipment, including spreaders, tractors equipped with bulldozers, angle dozers and front end loaders, fresnos, carryalls, graders, power shovels, drag lines, ditchers, clamshell buckets, dump cars and dump trucks.

No Sizeable Road Could Get Along Without a Pile Driver

For several years subsequent to the depression, little effort was made to improve the appearance of the right of way or to minimize fire hazards through the destruction of weeds and other vegetation, except those noxious weeds that were required by law to be cut. Although there has been a revival of interest with respect to the appearance of the right of way during the last three or four years, during which period a relatively large number of weed-destroying units have been purchased, most of this equipment owned by the railways is either outmoded or worn out and should be replaced. The number of units and range of types that are included in the budgets for the year demonstrate that numerous roads intend to correct this situation, for 187 units for destroying weeds will be purchased in 1941. They will include on-track and off-track mowers, tractor mowers and tractor-drawn mowers, ballast discers, ballast scarifiers, weed burners, extinguisher cars and motor mowers. In addition, several roads indicated their intention to use chemical methods.

A continuation of the trend toward employment of off-track machines is easily discernible in any study of

1941 budgets. Whereas, five or six years ago special mention was made of the purpose to buy equipment on crawler mountings, the reverse is true today, attention being called to items that are to be given rail mountings. Two important reasons for this changed viewpoint were given by the engineer maintenance of way of a western road about six years ago when the movement toward off-track machines was just beginning to attract notice. In discussing his work-equipment program for the ensuing year, he said that he could no longer tolerate the waste of time involved in clearing trains with power machines that must be operated from the track, and called attention to the elimination of work-train expense where off-track units are available.

Off-Track Units Popular

Customs die slowly, and for several years little headway was made by off-track machines, except for those services that of necessity were performed at points remote from tracks. Through experience came realization of the many advantages inherent in off-track machines and the movement toward their adoption was quickened. More recently, the rising cost of work-train service, and particularly the decisions of the railway adjustment boards requiring the employment of train and engine-service men on equipment that cannot be removed readily from the track, have combined to accelerate the adoption of equipment that is free from all restrictions with respect to the movement of trains. Still more recently, the decision under the Wage and Hour law, increasing minimum wages to $0.36 an hour, has given further impetus not only to the use of off-track machines, but to the purchase of all types of work equipment. It should occasion no surprise, therefore, that all earth-moving equipment included in the 1941 budgets, except dump cars, are of the off-track type with crawler mountings, except the dump trucks.

Until recently, the trend toward the use of crawler cranes has not been so marked as in the case of tractors, ditching and other grading equipment, although many of the smaller cranes have been for off-track use. It is not difficult to understand why this has been so, for many of the larger cranes are intended primarily for on-track use. Furthermore, they must be of such design that they can be moved to distant points quickly in emergencies, a thing that may be difficult to do with large off-track machines. Yet, except for locomotive and rail cranes, all of those reported are to be on crawler mountings.

That there will be no slackening this year in the movement toward a wider use of small portable tools, principally for bridge and building gangs, is evidenced plainly by the fact that all but one or two of the roads giving information regarding their plans, included such equipment in their budgets. In this connection, several of them emphasized the fact that they expect to buy this type of equipment more freely this year than they have done previously. In addition, a number of roads included more portable generator sets than will be required for the operation of these tools.

Small Tools Increase

As in previous years it was difficult to estimate closely the number of units of this equipment, for most of the officers reported that they expect to purchase one or more generators or air compressors and several sets of portable power tools for bridge and building gangs, without specifying what tools they intend to include in these sets. However, in the budgets that were given us, 18 different types and designs were mentioned, including wood-cutting and boring tools, tools for cleaning and repairing structural steel, air and power hoists, clay diggers, sheet-pile hammers and wrenches of various kinds. In addition to the generators and air compressors that will be purchased to operate these tools, and the 12 generators that are included with portable electric lighting plants, 14 generators will be purchased, a total of 54. Also 60 air compressors, most of which will replace worn out or obsolete compressors now in service with tie-tamping units, will be purchased, in addition to those included as part of tie-tamping outfits and those included with the sets of small tools. As nearly as can be estimated about 360 portable power tools suitable for bridge and building work will be purchased in 1941.

Prior to four or five years ago, the purchases of automotive equipment for highway use was practically negligible. Since then, this type of equipment has had a large place in the work-equipment programs of many roads, and the 1941 budgets indicate a continued increase in the use of this equipment, for they include approximately 110 motor trucks, 40 highway trailers and 30 passenger automobiles.

Continues to Expand

No fact connected with work equipment is so impressive as the continued expansion of its use. It is scarcely a quarter of a century ago that the mechanization of the maintenance forces began, and at that time only a few types of equipment, such as motor cars, locomotive and wrecking cranes, tie tampers, lidgerwoods, pile drivers, clamshell buckets, steam shovels, bridge derricks, concrete mixers and steam and air hoists, were available to officers who were seeking mechanical aids for their work, and none of them were in universal use. This is in strong contrast to the many types that are at the command of maintenance officers today. It is worthy of note that no fewer than 118 types of equipment were purchased in 1940 and that the relatively few budgets upon which this study is based include 77 different types for a far wider range of work than those available 25 years ago could have performed. It is also of incidental interest that all of the designs then available are obsolete, and that one has disappeared, having been superseded long since by machines of improved design that are easier to operate, that have greater capacity, and that do their work more effectively or demonstrate greater economy.

One who has followed the trends in the use of work equipment through the years can scarcely fail to be impressed with the fact that, in addition to the ever widening variety of work that is becoming mechanized, almost all maintenance officers today are keenly aware that a real shortage of work equipment exists on their own roads. This is becoming more and more noticeable, for as recently as six years ago a number of alert and up-to-date chief engineers and engineers maintenance of way said with some emphasis that they had all of the equipment they then needed or would probably need in the future. It has been of considerable interest to note that most of these officers have since changed their viewpoint and that their roads are among the larger purchasers of work equipment, while the remainder are also finding that work equipment possesses advantages of which they were not fully aware when they made this statement.

In other words, the inexorable pressure for greater economy in every operation is dissipating the self-satisfied attitude that was apparent in this and other quarters no longer than six years ago, and is replacing it with a keen appreciation of the fact that unless these officers are able to develop a fuller and more intensive use of work equipment they will be unable to maintain the higher standards of work that is being demanded of them, or to lower the cost of the work they do. The realization of this important fact is also apparent on other roads in the larger purchases and wider use of work equipment by those roads that have been the largest users of work equipment. It is also shown by the

fact that year by year roads that have never used power machines, except motor cars, are beginning to purchase work equipment.

Realize Need

Few maintenance officers today are unaware of the benefits they derive from mechanization of their work, although some of them are too much inclined to rely on the actual financial returns they can obtain, ignoring the more intangible advantages of better work, safer performance, larger output and more satisfied labor. On the other hand, some of them who are most aware of these advantages have experienced some difficulty in convincing their managements of their needs, because their budgets have not been accompanied by proof that these advantages really exist. With most of them, however, it is a matter of deciding what their most pressing needs are and then of preparing their budgets accordingly, for there are few managing officers today who are not aware of the economic advantages of power machines and tools.

In general, maintenance officers are keenly aware of the shortage of work equipment on their roads and most of them are eager to buy to the limit of their resources, for they are realizing more and more that under any conditions, except those of cheap labor, work equipment alone leads to economy and that under existing conditions it has become impracticable to turn out either the quality or the quantity of work that is necessary, without mechanical assistance. Furthermore, as the national defense program gathers headway, not a few of these officers visualize a real shortage of labor that can be made up only through the use of machines.

Wages Are Advanced

Another factor tending to increase the economic value of power machines and tools and to make their use more attractive, has appeared during the year. This is the decision under the Wage and Hour law which has been mentioned and which became effective on March 1, raising the minimum wage for labor. This decision will not only cause a further reduction of forces, but by increasing wages, will make the use of all work equipment more attractive and will bring into the picture certain types of machines that could not heretofore be justified from a purely economic standpoint.

To one who cares to study these matters, it is evident that today practically every condition that affects the use of work equipment tends to expand rather than curtail its use. An example of the influences that are at work is the gradual increase in wages that have been forced on the railways in the face of reduced revenues and widespread unemployment. Another influence tending to increase the use of power machines and tools is found in the efforts of manufacturers to improve their designs in such a way as to increase the economy of their machines. It was testified at the hearing that was held preliminary to raising the minimum wage, that some forms of equipment will save enough money in a single season, not only to pay all operating, maintenance and overhead costs, but also to wipe out the investment as well.

How Much Is Modern?

While a study of the trend toward the expanding use of work equipment is intriguing, there are other features of this use that are of equal interest. Among the first questions that arise when one considers the use of work equipment is how much of that now in use is modern, how much is obsolete and how much is worn out. To gain some idea of the trend toward modernization, all of the officers participating in this study were asked to state how much of their present equipment is obsolete, how much is worn out, how much is modern, and how many of the units included in their budgets are for replacements and how many represent additions to the equipment they now have. They were also asked how much of their equipment is approaching the end of its service life. As might have been expected, the answers ranged between wide limits. Indicating that no type of work equipment has yet reached the point of saturation, no road reported that all of the units included in its budgets are for replacement. In contrast, several roads indicated that all of their items are additions.

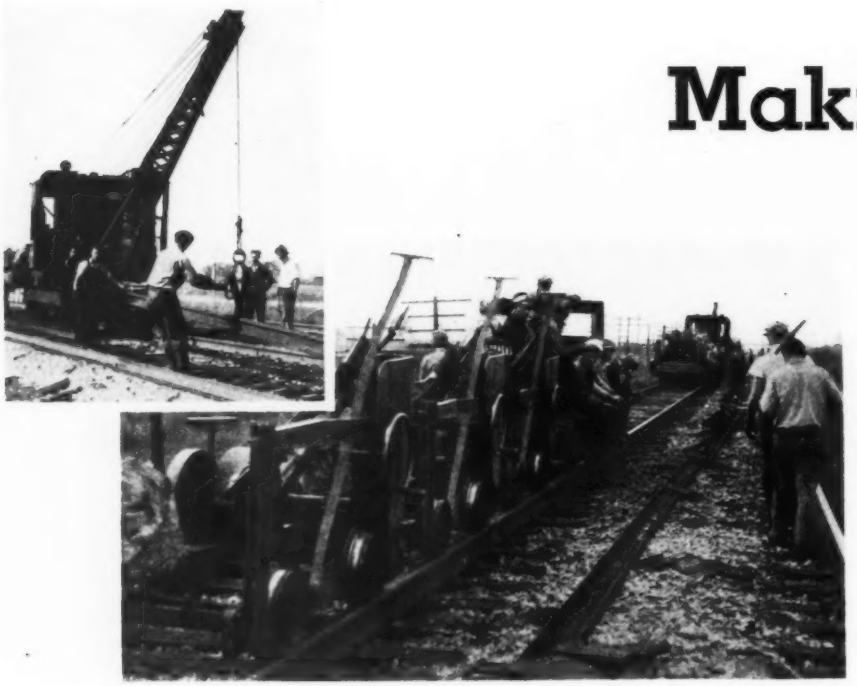
Few roads are willing to admit that they are carrying obsolete units of work equipment, although most of them said frankly that much of their equipment is not modern. Others asserted that all of their equipment is modern, explaining that they have adopted the policy of retiring any unit as soon as a better or more economical design becomes available, provided it is enough better to justify this action. Obsolete units were reported by a few roads, several of which admitted that little of what they own is modern. Some in this group said that until recently they had bought no work equipment since the onset of the depression, and that when they did begin to buy they were so badly in need of power machines that they were unable to make replacements. They asserted that as soon as their most pressing needs are satisfied they expect to begin to replace their older units with the latest designs available.

It is somewhat surprising to find that, despite the active buying that has characterized the last three or four years, the number of outmoded units on individual roads range up to 90 per cent of all equipment owned, with the larger number of roads ranging from 25 to 50 per cent. While some officers exhibited some reluctance about admitting that they are retaining in service worn-out units, one or two roads reported that a considerable number, in one case as many as 40 per cent, and in another "most of what we own," are approaching the end of their service life and must be replaced. It is evident from these statements that to the unfilled need for additional units there must be added a still further demand for power machines and tools to replace those that are worn out or outmoded by reason of more recent designs.

These facts indicate (1) that there is an expanding use of work equipment that should extend far beyond the predictable future, so that no one can yet foresee when the point of sat-

(Continued on page 187)

Tie Pullers and Saws May Be Expected to Be Among the Equipment Purchases in 1941



Making Work E

Rail-Laying Operators Are Highly Mechanized on the Pennsylvania, Most of This Work Being Done With Fully-Equipped Rail-Laying Train Forces

By J. G. HARTLEY

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Pennsylvania, Philadelphia, Pa.

J. G. HARTLEY

WHILE labor saving machines and devices for carrying out maintenance of way work have been coming into use gradually since 1920, the greatest development in this equipment occurred from 1925 to 1930. This increased development forced a renewed interest in the purchase and use of such equipment in order to increase the efficiency and production of the track forces, a factor which took on still greater importance with the drastic reduction of forces with the beginning of the depression years.

The old saying, "to the victor belonged the spoils," was never truer than it has been during the depression. With finances at low ebb, few machines were secured, and those who were fortunate enough to get hold of a labor saving device hesitated to loan it to any other territory if it was at all possible to retain it. As a result, many of those mechanical units that were purchased were not operated to their capacity, and the savings which should have been obtained were not realized.

Maintenance of way work equipment includes all power tools that are used in maintenance of way work, whether large or small. Power tools are devised to increase production and thereby decrease production costs. They have a certain monetary value; and the interest and depreciation on this value should always be added to the cost of the work performed by them.

If only one item of work is performed with a piece of equipment during the year, the production cost of that work will, in all probability, exceed the cost of doing the same work by hand, with the result that no justification exists for the possession of the particular piece of equipment. If, on the other hand, several items of work are performed throughout the year with this same unit of equipment, the production cost of the work will be greatly decreased, and, with all possible items of work programmed for the unit, its possession will, no doubt, result in considerable annual savings, and thus be more than justified. To bring about this latter situation, the use of all labor saving equipment should be programmed by division, grand division, region or system, according to the work which has to be done, and the results obtained should be carefully scrutinized to ascertain definitely whether the use of the equipment is being justified.

Must Show Savings

No power unit should be secured that does not effect an actual annual saving. When a unit is purchased on the strength of an estimated annual saving, a thorough check of its production and of the costs involved, including interest and depreciation as well as the cost of running repairs and yearly overhauling, should be made in order to arrive at the actual total cost, and thus make it possible to ascertain whether the estimated annual savings are being secured. We must all consider making an investment in work equipment as if we were making it for ourselves. If we would not venture our own capital for a piece of equipment on the basis of an adequate return, we should not recommend its purchase on the part of the railroad.

When about to purchase additional equipment, a careful investigation should be made of all commercial units available, including not alone units designed especially for the particular class of work in question, but also those capable of performing several classes of work. In the multiple-purpose machine there is sometimes the opportunity to increase production, and thus annual savings. The

*Due to conditions beyond his control, Mr. Hartley, at the last minute, was unable to attend and present his paper before the convention. To fill the gap in the program, Mr. Rothe was asked to discuss the same subject from the standpoint of the Western region of the Pennsylvania, and, without time to prepare a paper, did so extemporaneously. Subsequent to the convention, Mr. Hartley's paper was submitted to the association for inclusion in its Proceedings, and is presented herewith, together with an abstract of Mr. Rothe's remarks.

Equipment Work

This is the story of the many measures taken by the Pennsylvania to insure the greatest return on the more than $7,300,000 which it has invested in work equipment, as told by J. G. Hartley, assistant engineer in the office of the assistant chief engineer-maintenance of the system, and F. H. Rothe, assistant engineer, Western region, in papers prepared for presentation before the recent annual convention of the Roadmasters' Association in Chicago*

Cleaning Shoulder Ballast with a Mole on the Western Region of the Pennsylvania

problem of purchasing work equipment is primarily one of salesmanship on our part, supported by detailed data as to the results that can be obtained and the annual savings that can be secured. The necessity for this salesmanship does not end with the purchase of the equipment. It must be exercised continually by the supervising officer and those in actual charge of work, to sell the benefits of the units to those who operate them. This is necessary to obtain the greatest production at the lowest unit cost, including repairs and overhauling, for in the last analysis this is the yardstick of efficient use of any equipment.

Care in Assignment

To obtain the maximum use of work equipment, sufficient units should be assembled for a particular piece of work to permit as nearly as possible assembly-line mass production. To assign a power nutter, for example, requiring an operator and a watchman, to a supervisor or roadmaster, will not produce the results per man-hour of labor that are possible where six machines and six operators are employed, even though the latter organization involves two watchmen and a foreman. A number of maintenance of way items of work require occupation of the track, which involves frequent or prolonged interferences by train operation. I know of locations where only 38 per cent of an eight-hour day is actually obtained for actual work. Where such conditions prevail, it is evident that mass production must obtain in the working time available in order to accomplish results.

No unit of equipment should be assigned to one district if there is insufficient work on that district to keep it busy on a full-time basis. Neither should a single unit be assigned to any one person or district when greater production can be obtained by combining a number of such units to be operated by a specialized force with a foreman in charge. Where a number of units are combined under the direct supervision of a foreman, the foreman, being responsible for the production secured, will be more vitally interested in the accomplishments of the units and production costs.

Different mechanical units are designed for different classes of work. Therefore, it is desirable to assign them to those officers under whom they will accomplish the greatest amount of work. Clamshell buckets, for example, can be assigned to a supervisor or master carpenter if sufficient work is available under these men for their full-time operation. If there is insufficient work on a subdivision or division, however, these buckets should be assigned on a region or system basis, and when not in use should be held at one or more points readily accessible for shipment to other points as required. This will result in a smaller number of units, with less capital investment and with no lessening of production. The same holds true of the larger mechanical units. Each should be assigned in accordance with the programmed work to be done, so that the least idle time results and the closest supervision of its operation obtains.

Supervision Necessary

Many of us are not as mechanically minded as we should and must be to achieve the best results in our work. It is necessary, therefore, for us to analyze each maintenance operation to see if some unit of work equipment cannot be applied or added in the interest of greater efficiency. Furthermore, it is most important that we assign the equipment that we have so as to secure the most profitable use of it, and by our close supervision see that the desired results are obtained.

With the increased use of mechanical units, there is opportunity for an operator to advance to a better-paid job and, eventually, to a supervisory position. His advancement, however, must depend upon his reputation and his past record of performance with such units. Close interest and supervision pay dividends to those who decide that, when a job is to be done, it must be done well.

Rail End Cross-Grinding After Building Up Rail Ends on the High-Speed Main Line Tracks of the New York Zone

Most, if not all, roads, program their work for the entire year by months in order to meet the authorized budget. In this connection, it would be a distinct advantage if provision were made on the program chart to enter for each month the actual work performed, thus providing a direct comparison with the program. If this is done, a ready reference is at hand of what was done and of what should have been done. When the programmed rate is not achieved, the cause can be ascertained, and if work equipment is involved, the necessary remedy can be applied or the unit or units can be transferred to points where the required production can be obtained. A very few transfers of equipment because of ineffective use will suffice to secure the operating interest desired.

Reports Required

To secure the necessary supervision over equipment, it is necessary to insist that daily reports of its operation be made. These reports make it possible for all, from the machine operator to the chief maintenance officer, to be conversant with the use and production secured from each unit. The data required do not necessitate making out a large number of separate reports. On the contrary, sufficient information can be supplied, in the case of the Pennsylvania, in a total of four reports, as follows:

(1) Daily Report of Maintenance of Way Machine Operation; (2) Daily Report of Operation of Automobile Truck, Rail-Highway Truck, and Highway Truck Crane; (3) Daily or Summary Report of Operations of Regional Rail Laying Train or Division Forces on Laying Rail; and (4) Monthly Work Equipment Performance Report.

The fourth report suggested is a summary of the work done by each mechanical unit owned. In this report, each unit is listed separately under the type of unit to which it belongs.

With this monthly report, a complete record of the work performed and programmed for each mechanical unit on the system is available, and performance failures, either human or mechanical, can be corrected readily. In addition to the actual record obtained, the personal effort necessary to prepare and forward these monthly reports brings to each one connected with them a more intimate knowledge of each unit, resulting in a better understanding of the equipment, which is what is required for the best results. The report should be prepared by each division and forwarded to the chief maintenance officer of the road for his information as to the units used and idle. With these, he can take the steps necessary to transfer idle equipment to locations where needed; can maintain close contact with equipment undergoing repairs and can arrange for its return to service promptly; and can gage the production of each unit.

Regular inspections of each unit of work equipment should be made by qualified maintenance of way repairmen, in addition to the daily inspections made by its operator and reported on the daily operating reports. When a mechanical unit is in good working condition and is able to work without breakdowns, it gives a greater return on the investment than can be obtained from a unit working less than 100 per cent efficiently or only part time on the job.

At the end of the working season all mechanical units should be carefully inspected by competent maintenance of way equipment repairmen. If overhauling is required, they should be programmed for these repairs during their off-season so that they will be in the best condition possible for the following season's work.

Reports Are Essential

At first glance, the aforementioned reports and assignments may seem too voluminous and require too much time to prepare, but they are essential to best results and greatest economy. Every manufacturer working on a productive basis receives detailed reports on each operation in his manufacturing process. If they find this advantageous, why should any railroad buy a crane, for example, and then assign it to a point where it is used only when necessary, and is idle 75 per cent of the time? Should we not consider this investment of $8,000 or $10,000 as worthy of a daily report, to the end that it can be utilized most effectively?

Do we consider a mechanical unit made available to us as just another problem to be bothered with, or are we entirely sold on the idea that to secure the production necessary to maintain our railroad as it should be maintained, it is necessary to mechanize every item of work possible, and to follow each unit closely to see that the work is performed efficiently and economically? Where the former is true, and the officer in charge is not disposed to secure and train operators for the equipment, is too dilatory to require and insist upon having the daily reports of equipment operation prepared and forwarded to him, and is not particularly interested in planning his season's work or in having his superior officers intimately informed of the work accomplished by the forces assigned him, he will be soon looking around for another field of endeavor, and will probably be wondering why.

Must Mechanize Further

A review of annual maintenance of way expenditures and traffic handled shows a decrease in the expenditures in proportion to the decrease in traffic; yet more actual work must be accomplished to make the track structure suitable for the increased speed of traffic. At the same time, rates of pay have increased and straight time working hours have decreased, increasing the maintenance problems by decreasing production.

To offset this decrease in production, it is necessary to find a substitute

for that portion of manual labor still used, either in equipment already available or in the development of additional mechanical devices, transferring the manual labor to work for which mechanical units cannot be provided. Furthermore, as increased efficiency and production are obtained, the possibilities of covering a wider territory with each unit should be carefully considered and provided for.

The depression years, with decreased traffic and earnings, required the utmost economy in the use of labor and material and brought to the forefront additional efforts on the part of railroad employees to utilize the mechanical appliances to the largest extent possible. Railway supply companies likewise, with their usual markets closed, looked around for other openings and developed additional mechanical units to serve our maintenance of way organizations. The progress that has been made in the mechanization of maintenance of way operations is illustrated well by the changed situation on one road with which I am familiar. The capital investment in mechanical equipment on this road in 1925 was $1,052,000, whereas in 1939 it was $7,301,000, an increase of 645.3 per cent. This change was brought about entirely by the necessity for carrying out the work required with the reduced funds which were made available.

Replacements and Overhauling

With a large capital investment in equipment, replacement costs of the units involved must be reflected in annual maintenance of way expenditures. Considering a depreciation of 10 per cent in the case of the $7,301,000 invested by one road, as mentioned previously, the sum of $730,100 per annum must be taken care of in expenses to assure continuation of the same degree of mechanization. Divided by twelve, this means $60,843 per month on 14,600 miles of operated main track. This amount of money should be considered as a part of the monthly maintenance of way expenditures and should be set aside for the ultimate replacement of the mechanized units in service. No visible production would be secured from this sum, but it is vitally necessary to insure for the future the present degree of mechanization.

It has been stated that an annual overhauling of equipment is essential to insure that it is in first-class condition to produce the most effective work in the working season ahead, but we have yet to consider the important detail of providing the money necessary for the annual overhaul. This detail has been fraught with many difficulties in the past, but it can be handled adequately if, when the annual budget is prepared, a suitable sum to cover the overhauling of all mechanical units is arbitrarily set aside for this purpose. As each machine is prepared, the costs involved would be charged against this arbitrary amount, and expenses charged accordingly, thus insuring that all work equipment will be maintained in proper condition for operation when required, and that the proper return on the investment in it will be secured.

In conclusion, the problem of making work equipment work requires the following essentials:

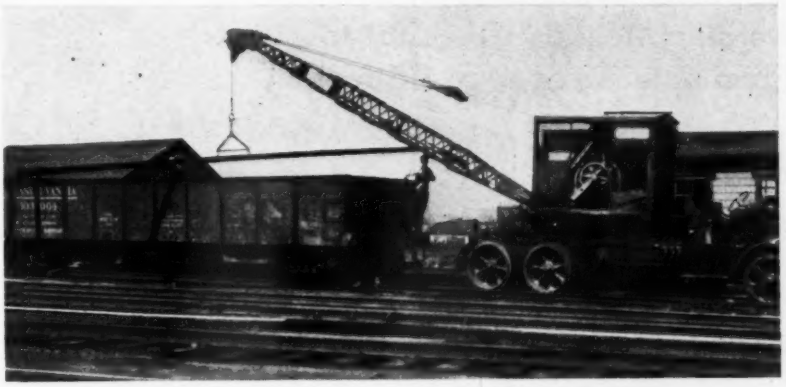
(1) All operators of mechanical units should be trained by qualified maintenance of way repairmen and should be placed as machine operators only after they have passed a thorough examination regarding the make-up and operation of the unit to which they are to be assigned.

(2) A competent force of maintenance of way repairmen should be maintained to make programmed inspections of each unit. When adjustments or running repairs are required to increase the efficiency of the unit, one of these repairmen should make them with the aid of the operator and should report to his superior officer the condition of the unit and whether it is being operated properly. He should also submit his recommendations as to the extent that an annual overhaul will be required at the end of the working season.

(3) A fully equipped designated shop should be provided, to which all units, not required for use during their off season, should be forwarded for thorough inspection, and for overhauling if necessary.

(4) An estimate of the total cost of overhauling all units of work equipment should be made and this amount should be added to the maintenance of way budget to be pro-rated through the winter months, to the end that all units can be put in good working condition as required for the followiong season's work.

(5) All units should be assigned for use in regional or system gangs, where the supervisors, work equipment engineers, maintenance of way repairmen and machine operators will be constantly employed with the same mechanical units, thereby obtaining greater efficiency and production with greatly decreased running expense.



One of the Truck-Cranes on the Pennsylvania, Loading Scrap Rail

Power Tamping Track on the Main Line of the Pennsylvania, Near Chicago

On the road where the above general essentials are adhered to and the work equipment engineers, the maintenance of way repairmen, and, if possible, the machine operators, are given an opportunity to assist in the overhauling of the equipment in the shop during the off-seasons, there will be no question but that its work equipment will work.

Detailed Reports Are Vital to Maximum Equipment Utilization

By F. H. Rothe
Assistant Engineer
Pennsylvania, Ft. Wayne, Ind.

IN order to secure the greatest service from our work equipment, we on the Pennsylvania have found first, that we must keep it in good working order, and second, that we must know where it is and what it is doing. We have worked this out by keeping a definite record of the use made of our machines, what is being accomplished with them, and where they are located. To this end we have several special report forms, which include M. W. 83, M. W. 81, C. E. 12, M. P. 132, and M. W. 15.

Equipment Reports

The M. W. 83 report, Daily Report of Maintenance of Way Machine Operation, is used in general for all equipment. It is made out daily by the operator and is sent to the office of the chief engineer maintenance of way, where the work performed, the hours worked, etc., are recorded and then summarized in a monthly report. This gives a concise picture of the extent of the use of the equipment for any particular period. If the reports indicate that the machine is not being used a reasonable length of time during the period, an effort is made to shift it to a point where it will be used more extensively. Another benefit derived from this report is the opportunity that it gives to the operator of the machine to report defective conditions. Those reports indicating defects are separated from the other reports and the necessary action is taken to facilitate the making of prompt repairs. After the reports have served the purpose of the office of the chief engineer maintenance of way, they are forwarded to the accounting department which takes from them such information as it requires.

The M. W. 81 report, "Daily Report of Operation of Automobile Truck, Rail-Highway Truck, and Highway Truck Crane," in addition to calling for certain of the general information called for on M. W. 83, also provides for showing the use made of the particular equipment in question, such as the number of trips made, the number of miles operated, the number of hours spent in traveling and in loading, the consumption of fuel and lubricants, and what repairs are required. To provide a check on the lubrication of trucks, we have a chart that is carried in the cab of each truck, on which every lubrication must be entered. This is required as a precaution against the neglect of lubrication in the event that some one is required to drive the truck who is not familiar with the status of its lubrication. A glance at the speedometer and reference to the record shart show the new driver immediately whether lubrication is due or not.

Rail Welding Report

Report C. E. 12, "Rail End Welding and Grinding," is used, as its name implies, for reporting rail end welding, by both the oxy-acetylene and the electric arc methods. It is also used for reporting rail end grinding, except the operation of our rail-grinding train, which is reported on form M. W. 83. The C. E. 12 form provides space for the tabulation of all expenses incident to the operations reported. It is made up monthly and provides a means for determining the unit costs of doing the work.

While the compilation of these reports appears to involve considerable added expense, it is our opinion that this expense is justifiable since it permits economy in the operation of the machines.

Another report that we have found very useful is the M. P. 132, "Crane Inspection" report. This is made monthly by the machinery maintainer on the division on which the crane is working, a qualified crane inspector from the motive power department, and the crane operator. This report must be posted at all times in the cab of the crane, and must be kept up to date. When a crane is overdue for inspection, the work equipment engineer is not permitted to operate it without permission from the superintendent of the division on which it is located.

Another function of the M. P. 132 report is to make it possible to anticipate the date when a crane must be taken into the shop for repairs. Generally, overhauling a crawler or locomotive crane of 8 to 20 tons capacity costs from $1,500 and $2,000. Since this is a considerable expense, it must be provided for in advance.

Still another report in general use is known as M. W. 15, "Maintainer's Inspection and Repair Report of Motor Cars." On this report, the maintainer's inspections of motor cars are reported bi-monthly and his inspections of motor trucks are reported monthly. These reports show the condition of the engine, chassis, wheels, tires, etc. We have found them a valuable check on the physical condition of the equipment as well as of material assistance in properly maintaining it.

Other Important Factors

Competent operators have been found to be one of the most important factors in the successful operation of our equipment. Therefore, every effort is made to select men for operators who will endeavor to operate and maintain their machines properly and conscientiously.

The operation of our maintenance of way machines is programmed early in the working season. Unfortunately, it is impossible to follow these programs exactly owing to changing conditions and, at times, the urgency of demands for work at localities not in accordance with the program. In view of these adjustments that must be made, it is necessary to have up-to-date information on the location and operation of the equipment so that it can be adjusted to the special demands with the least difficulty, while at the same time permitting adjusting the program to fit the special work. When daily reports are not compiled currently, we find it very difficult to accomplish these ends.

Since equipment in a good state of maintenance is much more efficient than that which is not, great effort is made to maintain our equipment to a high standard of maintenance. To accomplish this, each machine operator is required to take care of the current maintenance of his unit in-so-far as he is qualified to do so. Repairs beyond his ability to handle them are made by a division machinery repairman. When a machine reaches a state of maintenance where its efficiency is materially impaired, it is taken out of service and is sent to the shop for general overhauling.

Getting the Most Out of Work Equipment

In this paper, presented before the Maintenance of Way Club of Chicago on January 27, the author tells of the outstanding economies being effected with work equipment on the Denver & Rio Grande Western, and then calls for increased studies of unit costs and a more open mind on the scrapping of obsolete units

By A. E. PERLMAN
Engineer Maintenance of Way, Denver & Rio Grande Western

A. E. PERLMAN

DURING the last year, mechanized armies, with their activities perfectly coordinated, have changed our entire concept of what is possible in war today. Almost as startling as the results obtained by these mechanized forces are some of the results being obtained through the mechanization of maintenance of way operations. For facts and figures, I find it necessary to draw upon the Denver & Rio Grande Western, but the examples cited will apply with equal force to the majority of the railroads of the country.

The D. & R. G. W. began a study of the possibilities in the use of modern work equipment in 1936. An analysis of our problem showed that our largest waste in maintenance of way work came from non-productive work-train costs, including the preparatory time involved, pay during meal hours, delays to revenue trains, wasted time in sidings, the need for additional telegraphers to put out work orders, and overtime for agents and telegraphers.

Four years ago, our dirt-handling equipment consisted of 11 steam ditchers and four 2½-cu. yd. railroad-type steam shovels. These we retired, together with two spreaders and a rotary snow plow. Their place has been taken by a number of crawler draglines, shovels, bulldozers and front-end loaders, which, together, cost $85,000. What have been the results?

In 1937, our expense for work-trains alone was $348,000. This included only train crew wages and rental of equipment and repairs, not the other indirect costs mentioned previously. With a program in 1940 larger than in 1937, work-train expense amounted to only $53,000, a saving of nearly $300,000 a year on work-train expense alone, with an investment of $85,000—a saving equal to 13 per cent of our total expenditures for ordinary maintenance of way and structures.

The Rio Grande is a mountain railroad and, consequently, ditching is a heavy item of expense, especially during the cloudburst season. Our work-train costs for ditching in 1937 amounted to $140,000. In 1940 they amounted to only $1,000 and we moved nearly twice as much material as in 1937. The off-track machines purchased permitted us to clean out channels filled by wash-ins, work that was handled heretofore by teams or contractors' equipment; to construct surface ditches, fill bridges, change channels and build subgrades required to lighten curves.

Skeptics said that it would be necessary for us to retain our steam ditchers and work-trains because of the deep canyons and heavy cuts

The Denver & Rio Grande Western Is Making Extensive Use of Crawler-Mounted Equipment in Operations Such as Those Shown Above, Grading in a Yard, Unloading and Spreading Ballast, Loading Snow at a Team Track, and Widening Out a Cut

A ½-Cu. Yd. Shovel Loading Dump Trucks on a Bridge-Filling Job

along our line. The $1,000 spent for work-trains in 1940, which was for work-trains in connection with a steam ditcher, was spent only because we did not have sufficient off-track machines to take care of our needs during the cloudburst season.

The use of a snow blade on one of our tractors permitted us to scrap the rotary plow used formerly for clearing slides on our Park City branch, the plow having been damaged when it struck a large rock. The purchase of a snow blade for another machine made it unecessary to rebuild a snow shed on our Silverton branch, which would have cost $32,000.

Effective at Wrecks

In addition to the lower costs with our off-track equipment, emergency work has been greatly expedited. With our on-track machines, it was necessary to start at each end of the area affected and to work each way until the track was open. With our crawler-type machines, work can be carried on from any number of points. As an illustration, last year, as the result of a cloudburst, we had 19 wash-ins in a distance of five miles in Glenwood canyon. Normally, with our older type equipment, it would have taken us three days to clear the line, but with bulldozers, used to push the debris directly into the Colorado river, and working at a number of points simultaneously, the line was opened in one-third that time. Now, when required to load emergency material, it is not necessary to spend several hours cutting in the large steam shovels used previously. The crawler-type equipment moves directly into the bank of dirt or rock.

At a collision, where it was not possible to get a locomotive to pull the cars back into the clear, crawler-type tractors were employed. Their effectiveness is described in the following letter from the division superintendent:

"This accident occurred at the west switch at Desert to RO train, which was traveling at about 45 m.p.h. when a broken side frame on a truck opened a switch under the train. About 16 cars were derailed before the train came to a stop. Cars were piled up several cars high, blocking both main and side tracks. About eight cars, most of which were demolished, were in the center of the pile. The problem, of course, was to clear away the wrecked cars as quickly as possible. Under ordinary methods, with a derrick working at each end, as a single car or portion of a car was rerailed or cleared, it would be necessary to build additional track to hold the derricks before resuming clearing operations.

"Two wreckers and the nearest dragline and crawler tractor were sent for, the tractor arriving first. As the two wreckers were restricted to working first on the cars at each end of the pile-up, which were not badly damaged, the clearing was expedited by the tractor, which first worked independently, and later in conjunction with the Grand Junction derrick, in handling some of the twisted cars. The derrick, pulling in one direction and the tractor pulling in a different direction, succeeded in straightening up the cars where they could be handled more easily by the derrick. As the derricks moved the cars into a position slightly in the clear, the tractor was able to get hold and pull them well into the clear. By such handling, a hole was made in the wreckage to permit the construction of a shoofly, so that the first train due was delayed only 30 min. In all, the wrecking operations took only four hours to open the line.

"With the line open, no further work was done until the following morning. While the derricks confined themselves to picking up and rerailing cars that could be salvaged intact, the dragline began to pull the demolished cars away from the wreck where they could be burned without endangering mainline traffic.

"After the wrecked cars and parts had been disposed of, the lading of the cars still remained at the point of pile-up, where it obstructed the rebuilding of the main track. This lading consisted of pears, barley and bullion, which was badly mixed with the subgrade and ballast. This was quickly cleared away by the dragline. As the bullion bars were contacted, they were piled separately, to be loaded later. The dragline was then used to pull out the bent and broken track material, place new rail and a new frog, pick up and deliver car trucks to the wreckers, load the steel parts of the demolished cars, and load the bullion. Without the aid of the off-track machines, almost every one of the above-mentioned moves would have required the use of the work train and wrecker, a slow and expensive operation."

Use Motor Trucks

In addition to the heavy equipment mentioned, substantial economies have been accomplished through the use of motor trucks. In 1937, our scale inspector stated that his work was becoming so heavy that one man could not handle it, and that it would be necessary to

Power Machines for Mowing the Right-of-Way Have Speeded Up and Cut the Cost of This Work

restore the position of a second inspector, which had been cut off during the depression and which had formerly permitted an inspector to work from each end of the railroad. As an alternative, a truck was purchased for him, which permitted him to carry test weights and tools from station to station, and directly to stock yards, freight houses, or other locations where it was necessary to test scales. He no longer had to wait for a train in which to move his outfit car, and soon found that the work could be handled easily without the addition of the second inspector.

Through the use of motor trucks for bridge and building gangs we have eliminated the necessity for a large number of outfit cars, and have made it possible for bridge and building men to be at home every night. They do not pay board, and the railroad has eliminated the time and expense necessary in moving outfits from place to place.

A truck was also purchased for our motor car maintainer, and in emergencies he can take sufficient tools and parts to repair equipment upon very short notice. He can also make periodic visits to our mechanized gangs and service their machines during his inspections.

This B.&B. Truck on the D.&R.G.W. Hauls Men and Materials Within a 50-mile Radius

How to Secure Equipment?

The large majority of maintenance officers are badly handicapped by the lack of cost data. I recall a serious interruption to traffic as the result of floods, when the purchase of two power jacks was recommended. When asked what could be saved through their use, I replied, "We have no cost data to determine the possible savings. This is an emergency, and we must have proper equipment to carry on the work expeditiously. We will probably save the cost of these machines in two weeks." After the machines were purchased, two men were sent out from the general office to make time studies of gang operations using hand jacks and using the power jacks. It was found that these machines paid for themselves in less than one week.

The problem of obtaining proper cost data to justify the purchase of new equipment is a most serious one, and is rather difficult of solution. Before spending $10,000 for a machine, the first question of management is, "What will it save?" The question is certainly a proper one; yet few railroads have sufficient accurate data on unit costs in maintenance of way operations to supply an answer. This handicap can be overcome, in a measure at least, through the co-operation of manufacturers in sending out new machines for trial, so that accurate cost data can be obtained in advance of purchase. With these unit costs available to other roads through the work of the American Railway Engineering Association, the Roadmasters' and the Bridge and Building associations, maintenance officers can give management cogent reasons for the purchase of equipment. Closer co-operation between manufacturers and railroad officers will also help to bring about new types of equipment needed.

A pool of certain types of equipment among associated railroads would also be helpful in sharing overhead costs, especially those machines which show large savings while in use, but which can be used in only a limited number of operations. I refer particularly to the power tools used by rail gangs. Compressors, bolting machines and cranes can be used during the entire year, but the machinery, intact, is used only during a portion of the year. If two or three small railroads would go into a pool on such equipment and would schedule their work so as to keep the equipment busy during the entire year, it is certain that the equipment would easily pay a return of 500 per cent annually on the investment in it.

Need Cost Data

Some years ago, Justice Brandeis made the statement that the railroads could save a million dollars a day in their operations. Abuse was heaped upon him. A comparison of the last 10 years with the previous 10 years shows that the railroads have saved more than a million dollars a day in maintenance of way expenses alone. Ten years ago, I was frankly skeptical, upon hearing Dean Donham of the Harvard Graduate School make the statement that any practice which has been in effect for two years should be examined with care; that after five years it should be examined with suspicion, and that after 10 years it should be cast aside and superseded by more modern methods. At that time, it sounded like a statement you would expect from one with a theoretical, rather than a practical, training. Why should we scrap a ditcher that can be used for 10 years more, or a concrete mixer that can, with the aid of some hay wire, be kept in service three or four more years?

In 1924, Foley Brothers, contractors, scrapped a huge concrete mixer that they had purchased only six months before. I was horrified, and asked their chief engineer why they indulged in such a wasteful practice. He said that after studying the unit costs with that machine, compared with those of a new machine that had just come on the market, they could not afford to keep the six-months-old machine in service. He said further, that if accurate unit costs were not kept, it would be impossible to know how to bid on a job or how to make a profit after a job had been obtained.

Railroad accountants tell us that we should not worry about unit costs; that the expense in procuring them would not justify the possible savings to be derived. We still have no cost data worthy of the name, but we are striving to develop some as rapidly as possible. Only a few of us have used cost control to the extent that is found essential by successful contractors.

It is my sincere belief that railroad maintenance officers, in their search for better machines and methods, should seek more complete data on costs, so that, as suggested by Dean Donham, they can examine with care any practice that has been in effect for two years; can examine with suspicion any practice after five years; and can, after 10 years, cast it aside for a more modern method.

What About

By A. F. BREWER

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It Is Up to the Operators of Power Machines to Know the Lubricating Requirements of Their Machines and to Apply Lubrication Intelligently

A. F. BREWER

THE care that is accorded the lubricating of maintenance of way work equipment probably has more influence in determining whether this equipment will function efficiently and reliably than any other single factor. Owing to the many diverse types of machines that are now in use and also to the wide range of climatic and other conditions under which they are operated, the problem of assuring that each unit will be correctly and adequately lubricated is not a simple one. It requires, first, an adequate appreciation of the mechanical requirements of the different machines under the various operating conditions to which they may be subjected and, second, a knowledge of the functions and limitations of the various grades of lubricants that are available for different purposes.

The Track Motor Car

In any discussion of the problem of lubricating maintenance equipment, the track motor car would seem to merit first attention. The motor car is often operated under unfavorable conditions, being exposed to the elements and frequently overloaded, and for these reasons it is essential that adequate lubrication of the various operating parts be assured. Since both two-cycle and four-cycle engines are used in motor cars, in water-cooled and air-cooled types and with from one to four cylinders, the problem of lubrication requires that attention be given the requirements of the different types.

Two-cycle engines are lubricated by mixing the oil with the fuel. Ordinarily, from one to two quarts of lubricating oil to five gallons of gasoline will give satisfactory lubrication. There will be occasions, however, when this proportion will have to be decreased or increased, depending upon the nature of the work the engine is called upon to perform and the atmospheric temperature. Under comparable conditions an air-cooled engine may sometimes require a richer mixture of oil and fuel than a water-cooled engine.

The oil and fuel should at all times be measured accurately and thoroughly mixed before being put into the fuel tank. Mixing may be accelerated in cold weather by heating the lubricating oil slightly before adding it to the fuel. If this is not done and the oil is poured into the tank without mixing, it will settle to the bottom of the tank where it will not only have a tendency to clog the fuel line but will fail to perform its function as a lubricant.

It will necessarily require more of a poor grade oil to lubricate a two-cycle engine properly than of an oil designed especially for this purpose. Furthermore, if the mixture should become too heavy to vaporize properly in the carburetor, there will be slow burning in the combustion chamber, with the formation of considerable carbon. Under these conditions the ports will become restricted, the deflector will become filled up, the rings will stick and there will be a general reduction in the efficiency of the entire engine.

There will always be some carbon formed but the oil used should be of such a character that it will leave a minimum of carbon deposit and that this will be of a soft fluffy nature. If the carbon is of a hard crystalline nature, its presence will be manifested by the overheating of the engine, with a decided loss of power, resulting in a poorly running machine generally. Also, the effectiveness of the seal between the piston rings and the cylinder walls cannot be assured unless an oil is used that is designed especially for motor car engines. Unless this seal is maintained, the engine will not develop the proper compression for the most powerful explosion.

Because of the desirability of using a type of oil in two-cycle motor car engines that is suitable for year-around service, considerable field research looking to the development of such oils has been carried out by the petroleum industry in co-operation with the railroads. This research has resulted in the production of some highly satisfactory lubricating oils within the 20 to 60 range (S.A.E.), which are suited to a wide range of operating conditions.

The Four-Cycle Engine

The four-cycle engine may be either air or water-cooled and provided with either a force-feed or splash lubrication system. When this type of engine is running properly, the lubricating oil will be subjected to considerably lower temperatures than in the two-cycle engine, this being in part attributable to the cooling action of the oil as it circulates through the engine. On the other hand, this oil, as in the automotive engine, is often subjected to very

*Abstracted from an article appearing in an issue of Lubrication, a magazine published by The Texas Company.

Equipment Lubrication?*

In this article, the author discusses the mechanical requirements of the different classes of equipment employed by maintenance of way and structures forces, with respect to lubrication, and gives helpful information concerning the types of lubricants suitable for the various machines

Subject to Adverse Weather and Heavy Loads, it Is Essential That the Various Operating Parts of Motor Cars Be Lubricated Adequately

severe operating conditions. It may be diluted by gasoline working past the piston rings or it may be contaminated by dust and dirt which may work into the crankcase.

In addition, where poorly refined oils are used in any crankcase oiling system, they may accelerate the formation of sludge, due to agitation of the oil at high temperatures after it has been diluted with unburned fuel. Water, as a product of combustion, assists in the formation of sludge, which tends to plug up the oil screen and to clog small oil holes and passages leading to important bearings.

It is, therefore, necessary to observe regular periods for draining and cleaning the crankcase of a four-cycle engine. At the same time, this procedure will permit the use of seasonal grades of oil according to climatic conditions. In the selection of such oils, it is well to observe the S.A.E. viscosity range recommended by the engine manufacturer. Here, as in the case of the two-cycle engine, one can expect that the S.A.E. 20 to 60 range will apply to the usual operating conditions.

Lubricating Transmission Gears

Many four-cycle engines are designed to drive the car through a friction drive while others employ a conventional automotive transmission gear set. While it may be of advantage to the operator to have the flexibility of transmission gears, he is confronted with another part to be lubricated and unless his gearing is protected by a suitable refined gear lubricant, car efficiency and ease of handling will be reduced. It is especially important to use seasonal grades of gear lubricants, particularly where weather conditions may be extreme.

Lubrication of the transmission mechanism will depend largely on the arrangement employed and the type of car. Gearing should generally be serviced with a good grade of straight petroleum gear lubricant having a viscosity of about 200 sec. Saybolt at 210 deg. F. This lubricant should be capable of maintaining a sufficient film between the gear teeth, but never so heavy as to cause an excessive consumption of power. For low temperatures an S.A.E.—140 transmission lubricant should be used, while in warm weather an S.A.E.—250 lubricant will undoubtedly prove satisfactory.

Axle Bearings

Motor-car axle bearings are largely of the anti-friction roller type. These bearings are carefully housed to retain their charge of lubricant and are usually packed with a special bearing grease when assembled. In some cars, however, oil is used as the make-up lubricant and, to facilitate application, a suitable orifice is provided in the bearing housing, in which a wick is inserted, which prevents the entrance of dust or dirt and also filters the oil before it reaches the bearing.

Another type of roller-bearing axle housing carries a pressure gun fitting. Here, when relubrication is necessary, the same grease should be used that is used for packing the bearing. However, the waste-packed plain bearing is designed for relubrication in much the same manner as the A. A. R. journal box. When such bearings wear, they leak oil and also permit the entry of track dust. At least one road has found it advantageous under such conditions to replace the waste with a heavy fibrous grease.

The lubrication of other parts of the car should not be difficult. Where there are provisions for grease lubrication on brake connections, loose wheels and axle boxes, a good grade of cup grease of about No. 3 consistency, or one that will not melt out too easily, should be used. For general lubrication where oil is employed, with cup or hand oiling, the lubricant that is used for the engine will answer all purposes.

Electric Tie Tampers

With electric tie tampers, lubrication is of considerable importance in maintaining the efficiency of both the generator and the tamping gun. The latter in particular should at all times maintain approximately the speed for which it is designed; otherwise, overheating may occur which may reduce the durability of the bearing lubricating film. This film can be maintained by means of oil of the type used in the crankcase of the engine, i.e., that within the S.A.E.—30 range.

The power generating element will normally involve a four-cycle automotive-type gasoline engine, the lubrication of which has already been discussed. The same oil that is used for the engine can be used on the

generator bearings where they are intended to be oil-lubricated, although some are designed for grease lubrication by means of a medium consistency anti-friction bearing grease. This materially reduces the frequency of relubrication for it is necessary to repack the bearings only two or three times a year. The oil-lubricated bearing should be serviced once every day.

Air Compressors

In the lubrication of air compressors, the cylinders require an oil that possesses certain very definite properties. It must not only lubricate effectively and resist water-wash when moist air is being handled, but at the same time it must resist decomposition when exposed to heated air; otherwise it might become a hazard owing to the possibility of an explosion occurring.

If the oil should be too low in viscosity at the operating temperatures in the cylinders, it might not have sufficient film strength to maintain the necessary seal between the piston rings and cylinder walls. An oil that is too heavy will, on the other hand, tend to develop gummy matter, resulting in the piston rings becoming stuck.

As some roads rely upon the oil carried over by the compressed air from the compressor to lubricate their tie tampers and other air tools, the vaporizing tendency of the compressor oil becomes of added importance. For this reason, the oil must be so refined as to remain in mist form in the air until the latter has passed into the tools, when it automatically gives up its oil content to insure their lubrication.

Carbon in its true form may develop in air compressor cylinders in a hard mass, or it may be produced in the shape of dust and pass out with the air. In the latter case, it will often collect in pockets, elbows or on sharp edges to become mixed with dirt taken in by the air, as well as with oil that has been vaporized in the cylinders and condensed later after cooling. Accumulations of this nature in the receiver are objectionable, for, if they are extensive, the oil content may gasify and become explosive. When carbon is deposited in cylinders accumulations sometimes develop on the valves and valve seats and in the ends of the cylinders, which may cause the valves to leak, frequently resulting in cutting and loss of efficiency.

Pale filtered distilled oils, where properly refined, show the least tendency toward direct carbonization and the development of carbonaceous matter, with the result that they are generally accepted as best suited to air-compressor service.

In the Case of Pneumatic Tools, Both Rotating and Reciprocating Parts Must Be Considered When Selecting the Proper Lubricants

Pneumatic Tools

In pneumatic tools, both rotating and reciprocating parts must be considered when selecting the lubricants, and, to meet the requirements of both types of parts, three distinct types of lubricants are available as follows:

(1) Compounded cylinder oils, these being required for tools exposed to considerable moisture.

(2) Light viscosity straight mineral oils of sufficiently low pour point to serve the valves, cylinders and bearings of high-speed tools.

(3) Light-to-medium consistency greases adaptable to heavier, slow-moving parts, or parts specifically designed for grease lubrication.

These products are manufactured with extreme care and the same consideration should be given to their selection and usage in the lubrication of pneumatic tools. Water, which may enter a tool mechanism either with the air or through leakage, will tend to wash off the lubricating film from any interior surface exposed thereto. For this reason, compounded mineral oils of relatively high viscosity, containing more or less animal oil in compound, are recommended wherever the equipment may have to operate in the presence of water.

Where track tools are designed to function dry, they should be as free from moisture as possible. Straight mineral lubricants are used with such equipment and, if they have been properly refined and are of the requisite viscosity and pour test, they will withstand adequately any washing effect that may result from the condensation of moisture from compressed air.

Effects of Dust and Dirt

The careless handling of track tools may enable dust and dirt to gain entry, which, along with the dirt that may be carried into the tool by the air itself, will be a cause of wear. It is not always possible to obtain clean air for this will depend upon its air intakes, whether air filters are installed, and the cleanliness of the inter-coolers and air lines. A dustproof strainer of suitable fineness in each inlet pipe will often remove the greater part of any solid foreign matter and protect the working mechanisms. This strainer must be cleaned at frequent and regular intervals.

While the type and extent of the refinement of the lubricants employed have much to do with the efficient operation of modern track tools, the means whereby they are applied or distributed have a marked effect upon their ability to function effectively. It is evident that even the best of oils or greases may fail to do their work if they are used haphazardly or applied in such a manner as to be unable to reach all the wearing elements of the tools. In many cases this will be due to ignorance; in others, neglect, often because the operator does not appreciate the lubricating requirements of his equipment.

There are many excellent oils and greases on the market, in most cases refined more or less especially to serve pneumatic tools, with a minimum of fluid friction, a maximum of sealing power in the prevention of air blow-by past the pistons, excellent lubricating ability and a pour test commensurate with the operating requirements. It is obviously up to the operator to use these products intelligently in accordance with the

recommendations of the builders of his tools and of the oil company from whom the lubricants are purchased.

The mechanisms essential to the operation of other mechanical track tools will require a medium-to-heavy machine oil or medium consistency grease, according to the bearing design, the provisions for relubrication or the type of housing provided for the retention of the lubricant. Sometimes, however, a unique design must be serviced, such as that involved in the elevating screw of the track-raising machine or the gathering mechanism on the Mole ballast-cleaning machine. Both are quite exposed and subject to heavy loads, so the greases used must be resistant to the weather and sufficiently heavy to carry the pressures. In addition, they must be adhesive, for if they drop off prematurely in warm weather their protection is reduced.

$7,700,000 For Work Equipment

(Continued from page 175)

uration will be reached; and (2) that as this expansion continues there will be an increasing demand for units of all types for the replacement of worn-out units and those that are becoming obsolescent. Manufacturers have sometimes expressed the fear that some types of equipment are reaching the point of saturation and that future requirements will be confined to replacements, and that the magnitude of the market will then be restricted by the desire of the railways to get the last ounce of service from every unit of work equipment.

Saturation Far Off

This assumption is not borne out by the facts as they are stated by the maintenance officers who assisted in this study, for their need for additional equipment is so great that only a few of them have been given the opportunity to make replacements of even those units that are at the end of their service life or that have been retained long after they should have been retired. Some of these officers indicated that they are endeavoring to maintain these older units in good operating condition, despite the higher cost of doing so, until they are able to replace them, to avoid the alternative of letting the work go or reverting to hand methods.

When the saturation point for work equipment is under consideration, one thinks instinctively of motor cars, for they have been used longer than almost any other type that is in service today, and their use is more nearly universal than any other class of equipment. For these reasons they should test the soundness or unsoundness of the assumption that when the saturation point is approaching, the market will be closed to further development and new designs, and that manufacturers will be compelled thenceforth to depend entirely on replacements and repair parts for their outlet. It is of interest, therefore, that despite the fact that practically every road in the United States and Canada now has enough motor cars in service to equip its regular forces, and despite the further fact that the 152 roads that reported their purchases in 1940 bought 1,639 units of this equipment, more than 1,600 motor cars of all types will be purchased again in 1941.

A similar example, and one that is almost as convincing, is provided by tie-tamping equipment, to refute the assumption that the saturation point is easily reached or that when it is the door is closed to further development. In considering this equipment, one must give due weight to its higher cost, compared with motor cars, wherefore there is a tendency on some roads to defer replacements as long as the existing equipment can be kept in operation, too often giving little consideration to efficiency or to the cost of maintaining old equipment, compared with newer models.

Furthermore, the high cost of what had come to be considered standard equipment for tamping ties, and the great weight of those units, which were suited more particularly for larger operations, such as ballasting and general surfacing, made it impracticable from both the economic and the physical standpoints to equip section or other small gangs with mechanical tie tampers. As a result of a rising demand for smaller and less expensive units, manufacturers were stimulated to develop such equipment and have thus created an attractive market for their products, without decreasing the market for the larger outfits. It is of interest, therefore, that at least 700 outfits, large and small, for tamping ties will be purchased in 1941, compared with 648 such outfits purchased in 1940.

That not a few of these outfits are being purchased as a part of modernization programs is evidenced by the fact that a considerable number of the larger outfits were reported to be for replacement purposes. On the other hand, without exception, the smaller units are intended as additions. These outfits include both the electric and pneumatic types, as well as the direct-drive type, and a considerable number of tamping tools.

More Roads Enter

These are all pertinent facts that should not be overloked by one who is considering any phase of the purchase and use of work equipment during 1941. It is equally important to keep in mind that, while the foregoing discussion is based on information received from maintenance officers who are experienced in the use of work equipment, and relates primarily to them, there are many roads that as yet have no work equipment of any type, except motor cars, and that not a few in this latter group are beginning to realize that they must mechanize their forces or reduce their maintenance standards to a lower level.

This realization is coming slowly to some, but that it is making itself felt is indicated by the fact that 152 roads purchased work equipment in 1940, compared with 124 in 1939, with 81 in 1938 and with 119 in 1937. With every indication pointing to the prospect that earnings for 1941 will materially exceed those of 1940, it may be expected that, in 1941, other roads will begin to use power machines and tools for the first time, and that the number of roads employing work equipment will increase from year to year.

Obviously only a few of the types of equipment that will be bought in 1941, as indicated by the budgets that were submitted, have been included in this discussion. Those that have been mentioned are typical. However, among the more important types that will be purchased in considerable quantities are concrete mixing and placing equipment, steam pile hammers, power-operated bridge jacks, tie pullers, tie cutters, tie nippers, road rollers, welding equipment, tie borers, portable pumps of various designs, rail and flange lubricators, rail benders, cribbing machines, grinders of various kinds, switch heaters, snow plows, sewer cleaners, etc.

While an effort has been made to trace the principal trends in the use of work equipment, there are so many cross currents and minor paths that it is impracticable to consider more than a few. Enough have been cited, however, to show that there is an over-all trend toward a wider use of work equipment of all types, and that there is a strong desire on the part of maintenance officers to modernize or to keep modern such equipment as they now possess.

When

Hundreds of Engineering and Maintenance of Way Officers Find That the Annual Exhibit of the N.R.A.A. Gives Them Their Best Opportunity Each Year to See and Compare the Large Amount of Equipment That Is Available for Carrying Out Their Work

G. R. WESTCOTT

EVENTS of the last decade have impressed deeply upon the minds of maintenance officers that, despite the savings that are possible through the use of work equipment and the complete impossibility of carrying on modern railway activities without the use of power machines and tools, it costs money to purchase work equipment and that after it has been acquired it costs money to own and operate it. Largely for this reason, in too many instances, when selecting work equipment, price is allowed to assume too much weight and other considerations, while they are not ignored, do not always stand in the rank they should occupy.

Should Study Features

In view of the somewhat intensive revival of interest in all forms of work equipment, and of the greatly increased purchases of this equipment that are being made currently, it seems pertinent to study the considerations that should underly these purchases and the relative weight that should be assigned to each. If we do this, it seems almost certain that we will find that we have been giving undue importance to some features and have passed over or have been indifferent to others that may be more important or that belong near the front rank.

Safety Always First

First among the considerations that should be given weight is that of safety. Entirely apart from the humanitarian point of view, a saving in first cost or an apparent economy in operation may prove costly in the end if the device has any feature or features that involve hazard to the operator or others who must work with or around it. In some cases an inherent hazard can be corrected by some minor change in design. This is illustrated by the situation encountered in some motor cars, in which an emergency application of the brakes automatically locks them in the applied position. With the wheels locked, the car cannot be turned readily to remove it from the track. In this instance, usually, only a small change is necessary to make it impossible to lock the wheels without definite action on the part of the operator.

Unprotected gears or chain drives, unguarded grinding wheels, poorly designed fuel systems involving fire hazards, inefficient devices for locking mechanisms against unexpected and unintentional movements, or any other element of hazard, if not readily corrected, should rule a machine out of consideration.

Off-track machines are to be preferred to rail-bound equipment, from the standpoint of both employees and traffic, as a matter of safety. Where machines with rail mountings must be used, weight and balance, as they affect the ease and speed with which they can be removed from the track, must be considered. Too often, the mind of the designer is fixed on the work the machine is to do, and safety features are easily overlooked. In such cases, a correction should be made before the device is placed in service; or, better still, the manufacturer should be forced to considerations of safety through loss of his market.

Sturdy Machines Needed

Railway work equipment is, by the very nature of its employment, subject to severe service. On a large railway it is difficult to police the maintenance of the equipment, for where machines are passed along from one division to another, the immediate user may take the view that if a machine can be coaxed to limp through the job he is doing, he can pass it along to the next man for the needed repairs, thus saving the delay to his forces while the repairs are being made. This practice results in more wear on parts than is likely to occur if the repairs had been made when it first became evident that they were needed.

For these reasons, sturdy construction is essential. Without proper choice of materials and care in design, both short life and heavy costs for maintenance of the equipment may be expected. It may be difficult to judge the adequacy of the construction of a new device, but careful examination of the specifications, or of the machine itself, will often disclose possible points of weakness. Machines that through test have proved to be weak in some particular should be avoided unless the manufacturer is willing to correct the design as may be necessary.

Selecting Work Equipment

By G. R. WESTCOTT

Assistant Engineer, Missouri Pacific, St. Louis, Mo.

In this article the author reviews the considerations that should be given weight in the selection of work equipment and emphasizes the need for insisting on the purchase of equipment that will meet these considerations. He believes that safety, adaptability, sturdy construction, simplicity and portability are of major importance, with first cost of secondary importance

Machines that are underpowered should be avoided. A motor that is of somewhat larger capacity than is actually needed may be slightly less economical in fuel than one that exactly meets actual needs, but this added margin of capacity will insure against power failures that experience has shown are so costly by reason of loss of time by the machine and the gang it serves. There is one possible exception to the general requirement of essentially sturdy construction, for if a device is used only intermittently and then for short periods, lighter construction may be acceptable in the interests of greater portability.

One of the difficulties connected with work equipment is that of maintenance. These machines are used at widely separated points and can rarely be sent to the shop during the working season, so that it is the universal practice to make ordinary running repairs wherever the machine may be, and even major repairs must often be made in the field without the convenience of shop facilities. Simplicity of design thus becomes a factor of importance, and care must be exercised to avoid machines that require special tools for dismantling or those having parts that are subject to rapid wear or to breakage and that are difficult to remove and replace.

Ease of Maintenance

It is obvious that sooner or later all machines will require repair parts and the difficulties that may be met in securing these parts must be kept in mind. Of the two sources from which these parts are secured, the manufacturer and the railway stores department, the latter is likely to be able to furnish them more quickly if they are carried in stock. This suggests that where a number of machines for a given purpose are to be owned, it may be desirable to standardize on a single design. This will permit the stores department to stock the items called for most frequently, without duplication for other machines of the same general type; it will also avoid the delay incident to ordering from the manufacturer as individual needs arise.

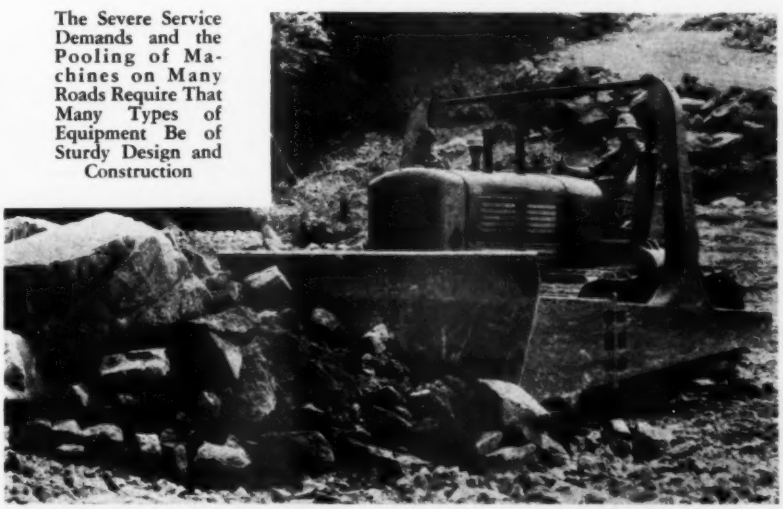
To a somewhat less degree, where practical to do so, it is well to have unlike machines powered with engines of the same make, or to have engine accessories, such as carburetors, magnetos and air cleaners, of the same type. This not only reduces the stock that must be carried, but where a single design of each device is employed, operators become more familiar with them and can adjust and repair them more easily and quickly because of this familiarity.

One other word needs to be said about repair parts. Avoid the machine whose manufacturer has a reputation for slow delivery of parts. Much unnecessary expense may result from failure to make prompt shipment of parts, for during this period of delay the machine and the operator may be forced to remain idle and the work of the gang may be disrupted.

Welding as a method of frame construction should not be overlooked in connection with the maintenance of the machine under consideration. While welding is being used to advantage to make connections between members of the frame for large equipment, it is generally to be avoided on small machines. With bolted construction, when a member fails, it can be removed easily and a new one can be installed in the field. If welding had been used in the original construction, the failure of a single member might easily require the application of an entirely new frame. Field welding for the purpose of making such repairs has not generally been satisfactory.

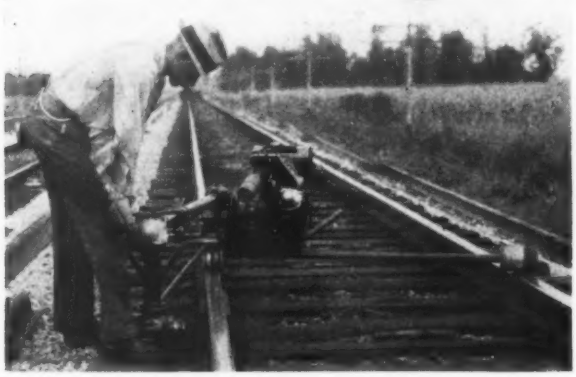
Is It Easily Portable?

Weight and ease of handling have been mentioned in connection with safety in the operation of machines. Portability is a factor of importance in



The Severe Service Demands and the Pooling of Machines on Many Roads Require That Many Types of Equipment Be of Sturdy Design and Construction

operating economy as well, especially with respect to the smaller machines. When labor was cheap, this was of less importance, but it grows in importance as wages increase. Fortunately, almost co-incidentally with the passing of cheap labor, alloys have come into widespread use, which permit adequate strength despite greatly reduced weight. Up-to-date manufacturers are using these light-weight, high-strength materials wisely; the wise buyer gives thought to the extent to which such materials have been used in the design. The manner in which they are being used is equally important, and usually involves more than the mere replacement of a heavy part with a similar part of lighter weight and equal strength. The use of alloys has caused a complete redesigning of the machine.



Ready Portability in Machines Is Highly Desirable From the Standpoints of Both Safety and Economy of Operation

In this connection, the use of aluminum alloys must be given careful consideration, and they should be avoided for parts that are subjected to severe strains. There have been cases of gear housings on small power-driven hand tools where the actual stresses were greater than the designer had expected, and the needed strength was lacking. A return to steel housings added some weight but gave much greater life to these parts.

Selecting the Type

Originally all work equipment was driven by steam. Today, few steam-driven units are purchased, the gasoline engine having almost entirely superceded the steam engine as the prime mover. In other industries the gasoline engine is, in turn, being replaced by the Diesel engine, with the result that considerable economy in operation is being obtained. However, several considerations have delayed the acceptance of the Diesel engine for roadway equipment. The first is that engines of this type, of the small horsepower required for small machines, are not yet available. Another is that gasoline, because of its wide use on small power machines and the universal use of motor cars, has become available almost anywhere on the line. Generally, Diesel fuel is not so widely distributed or so readily obtained. For this reason, to service a Diesel-powered machine it becomes necessary to establish a new line of fuel supply every time the equipment is moved to a new location. A third consideration is that through the common use of the automobile, the mechanism of the gasoline engine is well understood, while the Diesel engine remains somewhat of a mystery to many maintainers and operators. Another factor is that in the past Diesel engines have required independent and somewhat elaborate starting equipment, a thing that has raised doubt in the minds of maintenance officers as to the practicability of their use on portable equipment.

Because of the inexorable demand for greater economy in all railway operations, the Diesel engine will ultimately replace the gasoline engine as the latter has superseded steam. At present, however, full consideration should be given to the type of power, lest it be found that after the Diesel-powered machine has been placed in service, its economy in fuel consumption has been more than offset by an increased cost of servicing and maintenance.

Mention has been made of the desirability of off-track machines from the standpoint of safety. This preference holds for reasons of economy also. Time and tide are said to wait for no man; traffic seems about to join in this demonstration of impatience. In these days of high speeds for both passenger and freight trains, the on-track machine may be expected to spend a considerable part of the working day waiting for trains. Where the character of the work is such that off-track equipment cannot be used, thought should be given to power unloading devices by means of which the rail-bound machines can be removed from the track quickly.

Railway work differs in many particulars from work in other industries. Even though the work may, in itself, be similar, the conditions under which it is done may be so different that the purchase of equipment of special design may be necessary for the railway job. For example, some items of equipment that are used widely and successfully by contractors for moving earth may be entirely unsuited for use in the restricted area of the railroad right-of-way. Then, too, there is much work of a nature peculiar to railway maintenance that requires tools of special design. The economy in purchase, therefore, probably lies in securing the device best suited to the work to be done, even though, by reason of a more limited market, what appears to be an unduly high first cost must be paid for it.

While it is true, on the railway as in other industries, that much economy can be obtained by keeping each item of equipment in service as nearly continuously as possible, too much can be attempted in this direction. The use of a variety of power tools with a single power plant may be good business, but if a machine has been designed for a definite purpose, it may be of doubtful advantage to equip it with attachments by means of which it may also serve for some quite different use. Furthermore, too often the attachment is not at hand when needed, or the work may require that two jobs must be done at the same time.

Is Price Important?

In most cases, work equipment is bought under competitive bidding, so that price must and should be considered. It is well to remember, however, that generally the saving in first cost made by choosing the cheaper of two machines will at best amount to only a small percentage of the price. With the cheaper device, however, the losses that may result from personal injuries by reason of lack of safety features; from failures in operation or from short service life, because of weak construction; from the expense involved in keeping it in serviceable condition; from loss of time as a result of its lack of portability, or because it requires an open track on which to operate; from inadequate or unsuitable power; and from lack of adaptability, may add up to many times, not only the difference in first cost but the first cost itself. This is not a plea for the purchase of high-priced machines, for extravagance in the purchase of equipment is not to be condoned, but rather, an attempt to emphasize that in comparison with the other many considerations, first cost is *not* of major importance.

Motor Cars Are Made Today to Meet Almost Any Reasonable Demands, Which Requires that Special Care Be Exercised in Selecting Cars to Meet Special Requirements

Meeting Today's Requirements For Motor Cars and Trailers

By L. L. ADAMS
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L. L. Adams

Originally conceived of only as a means for reducing the time and labor involved in getting men to and from work, and while still performing this basic task, the motor car of today is being used for a much wider variety of services. Furthermore, changing methods of performing maintenance operations and the introduction of new practices in maintenance have so altered the requirements for motor cars that even recent designs are becoming obsolete. In this paper, which was presented before the Maintenance of Way Club of Chicago, Mr. Adams discusses today's requirements for motor cars and trailers, and shows that through the alert interest of manufacturers, there is a car and trailer for practically every need

AS the automobile has superseded the horse and buggy, so the track motor car has superseded the hand car. The hand or lever car was suitable for only one use, the transportation of men over the road more quickly and with less effort than by walking. With this function alone in mind, the first motor car was designed to relieve the men of the labor of propelling the car on which they were riding as well as to decrease the time required to go to and from their work and to place the men on the job fresh for work.

The first designs merely placed motors on lever cars. This was a very crude arrangement and lasted only a short time. The first specifically designed motor cars were only a slight improvement over this make-shift arrangement, but the demand for better cars became so insistent that manufacturers began a series of improvements to meet this increasing demand. This evolution has led to the present designs of cars, which are so numerous that one can be selected to meet any particular requirement, from the light, one-man inspection car to the large car designed for use with large extra gangs and for doing heavy trucking. In making these selections, consideration should be given to the service required, the number of men that will be available for handling the car, and the safety and comfort of the men who will use the car.

Let us begin with the lightest inspection car, as used by one or two men, such as telephone and signal maintainers, track patrolmen, motor-car maintainers, etc. A car for this service should be as light as practicable, so that it can be removed easily from the track by one man. As heavy loads are not to be carried, it is not necessary that the car be built as strong as cars that are used for other purposes. As these cars are to be used and handled generally by one and never by more than two men, they should not be equipped with tops or seats, as wind shields can be designed to provide ample protection for the one man in case of inclement weather.

Such cars should also be designed with free-running motors, since it is not safe for one man to operate a direct-connected motor because of the danger of the car getting away from him when starting it. Again, as these cars are generally used on long runs and the operator makes many miles during the month, the vibration that is always present in direct-connected motors is often injurious to his health. There are a number of men on the railroad at present who are suffering from various troubles that can be traced directly to the continued vibration of direct-connected motor cars.

Following the lightest car, that is,

those designed for one or two men, there is need for a larger and more powerful inspection car, to be used by two to four men, such as track supervisors, supervisors of bridges and buildings, and certain other division officers who are required to cover the road on motor cars, but are never alone. The general design of this type should be in line with that of the lighter cars, except that it should be made slightly stronger and have more power. It should be equipped with side seats and top, which will add to the comfort and safety of the men.

Recommends Tops

It is realized that on a number of roads there is a prejudice against equipping motor cars with tops, but it has been my experience that the addition of a top more than offsets the additional cost of construction and operation, in the protection that it affords the user, not only in personal comfort while making a trip during inclement weather, but also with respect to his general health. Every time a supervisor or other employee has to be off because of sickness it costs the railroad something, and it does not take many lost days to more than offset the additional cost of the top.

Equipping a motor car with a top and with glass in a front wind shield adds materially to the safety of operation. I know personally of a number of serious accidents caused by motor cars colliding during rainy weather. In each of these cases where two cars were involved, the one equipped with a top and a glass in the front wind shield was able to observe the approaching car in time to stop, whereas the operator of the other car, having his head down to keep rain out of his eyes and face, did not observe the approaching car until too late to avoid the accident.

In addition to avoiding accidents of this kind, the operator who is protected can also give closer attention to the rails to see that they are clear for safe passage, thus often avoiding derailment. These cars should also be equipped with free-running motors to avoid the excessive vibration which, as previously explained, is injurious to the operator.

Staff Inspections

Prior to 1929, it was customary for the division superintendent to make an inspection over his division, accompanied by his staff, using a business car, sometimes attached to a local train, but frequently handled by special movement. This method of inspection was costly and, to avoid the expense, most roads discontinued the use of business cars for this purpose during the depression. This immediately created a demand for some type of motor car that will accommodate six to ten men and that can be operated over the road with safety at a reasonable rate of speed.

This demand was first met by the manufacturer by the construction of a large motor car that was quite expensive and could not be operated without train orders, and this in turn required that the car be manned by crew from the train service. As this increased the cost of operation of the car, a number of roads did not feel justified in their purchases and this led to a lighter design of car that can be operated without train orders or train crews. To meet these requirements, some roads purchased automobiles equipped with flanged wheels and pneumatic tires. This type of car meets the fundamental requirements for getting over the road at reasonable speed and comfort; yet, the design is such that, with the exception of the driver and one man on the front seat, no one on the car can secure any better, or even as good, view of the track as he can from the rear end of a train. For that reason, a few roads did not like the automobile design as a means of track inspection.

To enable the superintendent, division engineer and the staff to make these inspections on the Louisville & Nashville, we purchased a specially designed car, equipped with a 36-hp., four-cylinder motor with transmission drive and four speeds forward and one in reverse, although this can be changed to four speeds in reverse and one speed forward by merely throwing a lever. The engine is placed at the rear, with the fan reversed so that it will remain cool while the car is moving forward. The front of the car is constructed with a glass wind shield at the top and metal at the bottom, with suitable openings that can be used when needed during the summer months.

There is a long seat across the front, of sufficient width to accommodate four persons, all of whom can obtain an excellent view of the track and can thus make a very close inspection. In addition, there are two single seats on each side, making the total capacity sufficient for eight persons, which is usually the maximum number that we require to be present on these trips. This car is also equipped with a hydraulic jack, so that it can be removed from the track easily at any road crossing, thus eliminating the necessity for running under train orders or using train crews, reducing very materially the cost of operation.

Sections Gangs Are Small

On most roads the depression led to a material reduction in the number of men employed on a section, and also to the lengthening of sections, in some cases to as much as 30 miles on branch lines, and a large number of gangs now consist of a foreman and three or four men. Such gangs should be equipped with a light section motor car that can be handled easily and, at the same time, be powered so that it can pull a reasonable load on a trailer. There are a number of such cars on the market and I have found that it is not difficult to select a car that will meet these demands. In fact, the present light-weight section car is capable of pulling about as much as the heavier cars that were in general use less than ten years ago. As these small gangs have to cover long sections and are often required to cover them during inclement weather, consideration should be given to equipping cars with suitable tops and with wind shields to protect the men while

Cars Used by One Man Should Be as Light as Practicable and Otherwise Designed to Permit Their Ready Removal From the Track by the Operator Alone

making such trips. As already explained, this practice adds not only to their comfort, but to safe operation. These tops will also protect the motor car while it is set off along the track, for when a motor is exposed to the weather, both in rain and hot sun, it is more difficult to maintain it in good running condition, and I am convinced that the extra expense of equipping these cars with tops will be more than justified.

As yet, a number of railroads have not concentrated their maintenance work in large gangs and are still using small extra gangs, consisting of from 10 to 25 laborers. They are also employing bridge and building gangs of 6 to 12 men per gang. These gangs require a motor car larger than that needed for smaller gangs. As such gangs usually have a large amount of trucking in connection with their work, it is necessary that the cars assigned to them be equipped with motors of sufficient size and power to pull two or three loaded trailers at one time. They should also be constructed so that they can be reversed easily for back-up movements. There are a number of cars on the market that will meet these requirements, using either disc or differential transmission.

Large Extra Gangs

On roads that have concentrated a certain portion of their maintenance work in large extra gangs, say for laying rail and surfacing, it is essential that such gangs be furnished with extra large and powerful cars. In the selection of cars for these gangs it is not so important to consider the weight as it is for the smaller units, for there are always sufficient men in the gang to handle the cars. By equipping these big gangs with large cars, the men are in position to handle the material needed for their work on trailer cars, eliminating the use of work trains and greatly reducing the cost of distributing such material. Bridge and building and extra gangs are not often required to patrol track in inclement weather, and it is not essential that cars selected for their use be equipped with tops. Furthermore, these cars can be used to better advantage for trucking when they are not so equipped, and I suggest, therefore, that only the medium-weight inspection and light section cars be equipped with tops.

There is not as wide a variation in the requirements for trailers as for motor cars. However, there is a need for trailers of different weights for use with gangs of various sizes. For small section gangs, a trailer should be selected that is well constructed and is equipped with roller bearings. It should be as light as possible, but still have the capacity to carry a load of from 5,000 to 6,000 lb. Usually, such a car will meet all of the needs of these small gangs, and can easily be handled off and on the track, when necessary.

The larger gangs should be equipped with trailers having a capacity of not less than 8,000 lb., and

The Author Sees a Number of Advantages in Equipping Motor Cars with Tops and Windshields

preferably of 10,000 to 12,000 lb. if they are large extra gangs laying rail or surfacing. If these gangs are of such size that all of the men cannot ride on the motor cars, the trailers should be equipped with seats and railing, so that the men can be transported with safety to and from work. These seats should be designed so that they may be removed readily when the cars are to be used for other work or are not needed for handling men. Frequently, the heavier trailers ordinarily used with extra gangs are not suitable for service with the cranes that are customarily used in laying rail. These cranes often pick up the released rail and scrap and load it on trailers to be moved to a nearby siding or to some other point where it can be piled conveniently for loading into cars. As the crane has sufficient power to pull heavy loads, it is difficult to keep the men from overloading the trailers. To overcome this difficulty, extra-heavy trailers should be furnished, having a capacity of at least 20,000 lb. It is true that such cars are very heavy, but as they are to be used solely with the crane, they can be removed easily from the track by the crane or loaded on cars when necessary. Therefore, the weight of the trailer need not be considered, as is necessary for trailers that are to be handled by hand. The use of these extra heavy trailers in conjunction with cranes often eliminates the necessity for a work train to handle rail to and from the cars, thus materially reducing the cost of this work.

Cost of Repairs

In selecting motor cars, their dependability and the cost of their maintenance must not be overlooked. A car out of service when needed may be very costly, and one that is always ready for use and does not require frequent attention from the maintainer is a decided advantage. The cars should be as simple as possible, and the operators should be instructed and trained to make minor repairs. It is essential that they be required to keep the cars clean and properly lubricated at all times.

A small, well-equipped shop, devoted exclusively to repairing motor cars and similar equipment, should be maintained. Such a shop is operated on the Louisville & Nashville, employing one foreman, four mechanics, one carman and one mechanic's helper. These men soon become proficient and are able to make repairs at a reasonable cost.

However, I find that the cost of these repairs varies widely between different makes of cars. A recent check developed the following repair costs in this shop, not taking into account cars that had been struck by trains or damaged in derailments, but including only those that were in need of general repair because of natural wear in service:

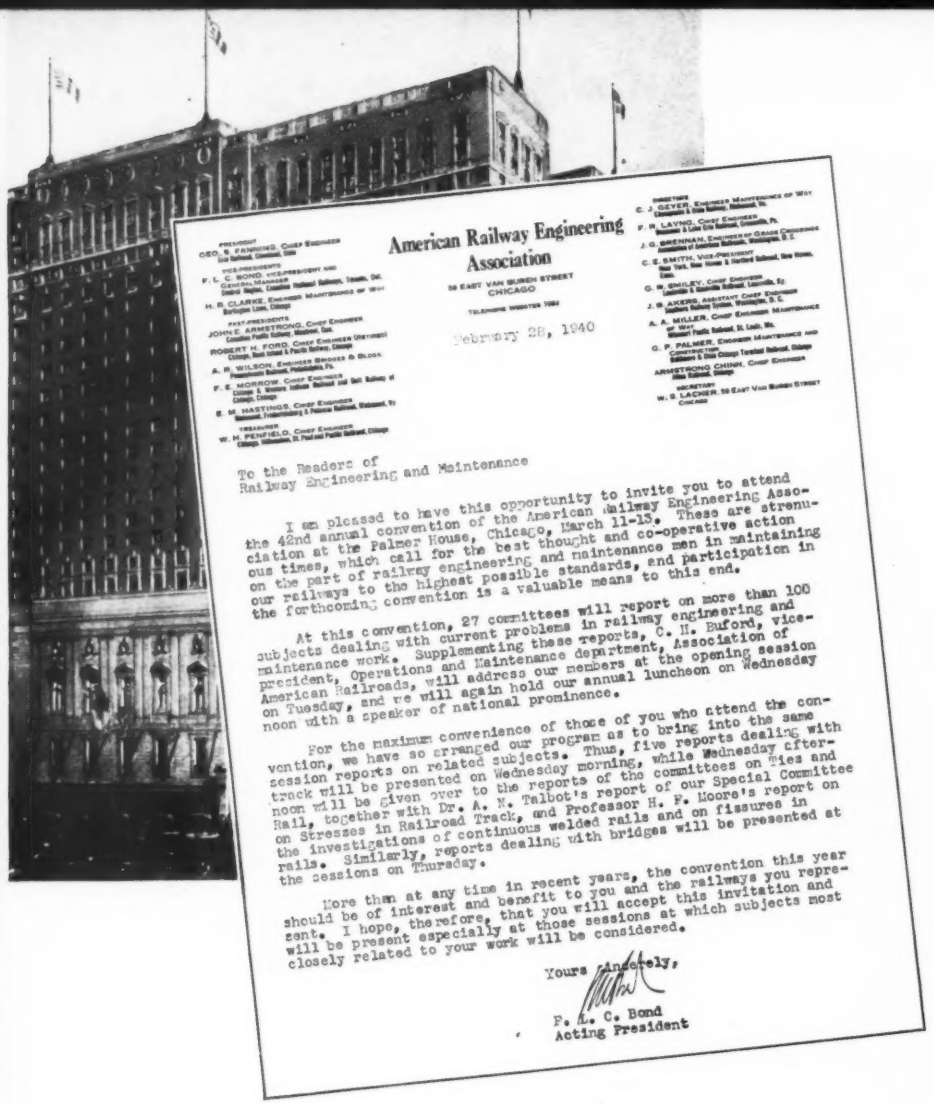
Make of car	Cost to repair	Per cent of the cost of a new car
A	$180	76
B	150	64
C	125	53
D	140	47

Ratio of the expected life of the repaired car to a new one—0.50

Ratio of repair costs per year of life compared with a new car were: A—152; B—128; C—106; D—94.

As a result of this check, we discontinued repairing cars A and B, but are still repairing the C and D cars. This check was also of assistance in selecting cars to be purchased in the future. It is believed that a similar study by other roads will be very helpful in making a proper selection in purchasing new cars.

It is realized that it is impossible for any one person to select motor or trailer cars that will invariably meet the approval of others, but this variance of opinion is what keeps manufacturers of motor cars in business and offers them an incentive to make improvements. A careful study of all cars now on the market will enable one to select a car that will meet any reasonable requirements.



American Railway Engineering Association
59 EAST VAN BUREN STREET
CHICAGO

February 28, 1940

To the Readers of
Railway Engineering and Maintenance

I am pleased to have this opportunity to invite you to attend the 42nd annual convention of the American Railway Engineering Association at the Palmer House, Chicago, March 11-13. These are strenuous times, which call for the best thought and co-operative action on the part of railway engineering and maintenance men in maintaining our railways to the highest possible standards, and participation in the forthcoming convention is a valuable means to this end.

At this convention, 27 committees will report on more than 100 subjects dealing with current problems in railway engineering and maintenance work. Supplementing these reports, C. H. Buford, vice-president, Operations and Maintenance department, Association of American Railroads, will address our members at the opening session on Tuesday, and we will again hold our annual luncheon on Wednesday noon with a speaker of national prominence.

For the maximum convenience of those of you who attend the convention, we have so arranged our program as to bring into the same session reports on related subjects. Thus, five reports dealing with track will be presented on Wednesday morning, while Wednesday afternoon will be given over to the reports of the committees on Ties and Rail, together with Dr. A. N. Talbot's report of our Special Committee on Stresses in Railroad Track, and Professor H. F. Moore's report on the investigations of continuous welded rails and on fissures in rails. Similarly, reports dealing with bridges will be presented at the sessions on Thursday.

More than at any time in recent years, the convention this year should be of interest and benefit to you and the railways you represent. I hope, therefore, that you will accept this invitation and will be present especially at those sessions at which subjects most closely related to your work will be considered.

Yours sincerely,

F. L. C. Bond
Acting President

Stage Is

A.R.E.A

Three-Day Meeting to Be Held at the Palmer House, Chicago, on Mar. 11-13

F. L. C. Bond
Acting President

Acting President Extends Special Invitation to Attend to Readers of Railway Engineering and Maintenance

THE forty-second annual convention of the American Railway Engineering Association will be held in Chicago on March 11-13. This meeting will take on added importance this year as railway engineering and maintenance officers face one of the most active years since the onset of the depression. As for a number of years, the meetings will be held in the Grand Ball Room of the Palmer House, and will be supplemented by the exhibit of equipment and materials of the National Railway Appliances Association in the International Amphitheatre, as announced on following pages.

For another year the A.R.E.A. has maintained its long record for diligent study, working through 27 standing and special committees, representing practically all of the railways of the United States and Canada. Of its more than 1900 members, approximately 850 are serving on one or more committees, which brings to the association a great breadth of knowledge and experience on the widely diversified subjects which it has constantly under consideration.

The program for the convention this year includes reports on more than 100 subjects, covering a wide range of routine and special problems confronting engineering and maintenance officers, problems which have not only been increased with the exigencies of the depression years, but which now promise to be further enlarged as the railways prepare for increased traffic and still higher speeds of operation. Representative of the reports to be presented at the convention are those on plans for switches, frogs, crossings, spring and slip switches; proper bolt tension for rail joints; continuous welding of rail; rail joint failures; pneumatic-tired tractor equipment; specifications for the design of wood bridges and trestles; specifications for lining railway tunnels; specifications for the placement of concrete culvert pipe; non-ballast type metal floors for steel bridges; cathodic protection for the prevention of corrosion of steel

Set for Convention

Program to Include Reports of 27 Committees on More Than 100 Subjects

tanks; terminal facilities required for the care of Diesel locomotive equipment; means of bringing to the attention of railway managements the value of a technical education; off-track grading equipment; and methods of determining the protective value of paints.

In addition to the reports of the standing and special committees, H. F. Moore, research professor of engineering materials, University of Illinois, will report on the joint investigations being made of continuous welded rails and fissures in rails, and W. B. Leaf, research technician of the Denver & Rio Grande Western, will present a paper on photo-elastic studies of stresses in rail joint bars.

Special features of the meeting will include an address at the opening session by C. H. Buford, vice-president, Operations and Maintenance department, Association of American Railroads, and the annual luncheon on Wednesday, which will be addressed by the Hon. Clarence F. Lea of California, chairman of the Committee on Interstate and Foreign Commerce of the National House of Representatives.

The regular sessions of the convention will be presided over by F. L. C. Bond, vice-president and general manager of the Central region of the Canadian National, and acting-president of the association, assisted by Vice-President H. R. Clarke, engineer maintenance of way of the Chicago, Burlington & Quincy. In the letter from Acting-President Bond, reproduced herewith, a special invitation is extended to the readers of *Railway Engineering and Maintenance* to attend the convention.

Program

42nd Annual Convention

Palmer House, Chicago

Tuesday, March 11

Morning Session—9:45 A.M.

Convention called to order
Address by F. L. C. Bond, acting president
Reports of the Secretary and the Treasurer
Memorial Tribute to President George Stokes Fanning, by by E. M. Hastings
Address by C. H. Buford, vice-president, Operations and Maintenance department, A.A.R.
Reports of committees on
- Standardization
- Signals and Interlocking
- Electricity
- Economics of Railway Location and Operation

Afternoon Session—2 P.M.

Reports of committees on
- Waterways and Harbors
- Highways
- Cooperative Relations with Universities
- Uniform General Contract Forms
- Water Service, Fire Protection and Sanitation

Adjournment at 4 p.m. for visit to the exhibit of the National Railway Appliances Association at the International Amphitheatre

Wednesday, March 12

Morning Session—9 A.M.

Reports of committees on
- Economics of Railway Labor
- Maintenance of Way Work Equipment
- Wood Preservation
- Roadway and Ballast
- Track

Association Luncheon, 12 o'clock

Address by Hon. Clarence F. Lea of California, Chairman of the Committee on Interstate and Foreign Commerce of the National House of Representatives

Afternoon Session—2:30 P.M.

Reports of committees on
- Ties
- Stresses in Railroad Track
- Rail

Report by Prof. H. F. Moore on the joint investigations being made of continuous welded rail and fissures in rails
Paper by W. B. Leaf, research technician, D. & R. G. W., on photo-elastic studies of stresses in rail joint bars

Thursday, March 13

Thursday Morning, 9:00 A.M.

Reports of committees on
- Buildings
- Yards and Terminals
- Records and Accounts
- Rules and Organization
- Iron and Steel Structures
- Impact

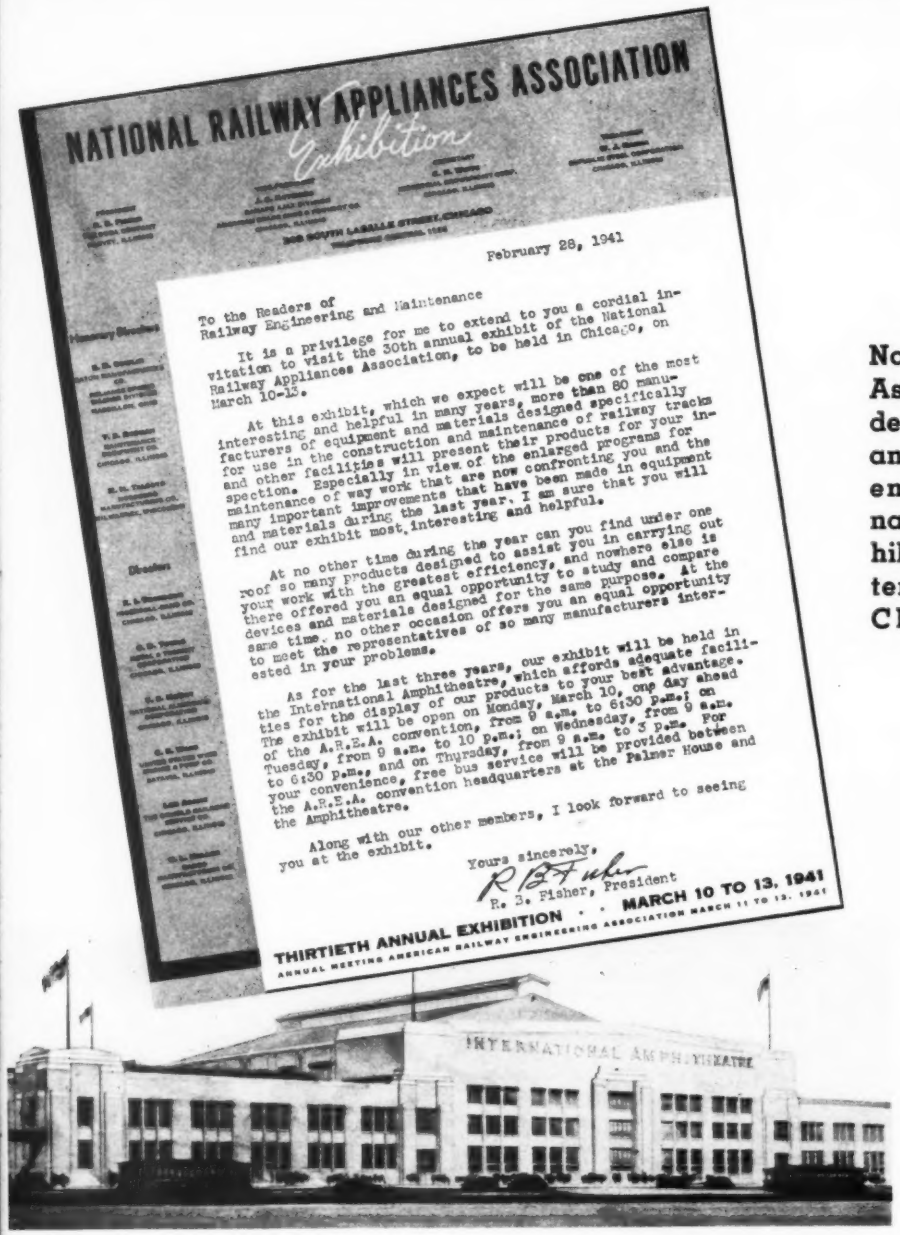
Afternoon Session—2 P.M.

Reports of committees on
- Masonry
- Wood Bridges and Trestles
- Waterproofing of Railway Structures

Closing Business

Equipment Exhibit

National Railway Appliances Association to show latest developments in equipment and materials of interest to engineering and maintenance officers at its 30th exhibit to be held at the International Amphitheatre, Chicago, March 10-13


NATIONAL RAILWAY APPLIANCES ASSOCIATION

Exhibition

608 SOUTH LASALLE STREET, CHICAGO

February 28, 1941

To the Readers of
Railway Engineering and Maintenance

It is a privilege for me to extend to you a cordial invitation to visit the 30th annual exhibit of the National Railway Appliances Association, to be held in Chicago, on March 10-13.

At this exhibit, which we expect will be one of the most interesting and helpful in many years, more than 80 manufacturers of equipment and materials designed specifically for use in the construction and maintenance of railway tracks and other facilities will present their products for your inspection. Especially in view of the enlarged programs for maintenance of way work that are now confronting you and the many important improvements that have been made in equipment and materials during the last year, I am sure that you will find our exhibit most interesting and helpful.

At no other time during the year can you find under one roof so many products designed to assist you in carrying out your work with the greatest efficiency, and nowhere else is there offered you an equal opportunity to study and compare devices and materials designed for the same purpose. At the same time, no other occasion offers you an equal opportunity to meet the representatives of so many manufacturers interested in your problems.

As for the last three years, our exhibit will be held in the International Amphitheatre, which affords adequate facilities for the display of our products to your best advantage. The exhibit will be open on Monday, March 10, one day ahead of the A.R.E.A. convention, from 9 a.m. to 6:30 p.m.; on Tuesday, from 9 a.m. to 10 p.m.; on Wednesday, from 9 a.m. to 6:30 p.m., and on Thursday, from 9 a.m. to 3 p.m. For your convenience, free bus service will be provided between the A.R.E.A. convention headquarters at the Palmer House and the Amphitheatre.

Along with our other members, I look forward to seeing you at the exhibit.

Yours sincerely,

R. B. Fisher, President

THIRTIETH ANNUAL EXHIBITION • • MARCH 10 TO 13, 1941

ANNUAL MEETING AMERICAN RAILWAY ENGINEERING ASSOCIATION MARCH 11 TO 13, 1941

INTERNATIONAL AMPHITHEATRE

President Fisher Urges Readers Attending the A.R.E.A. Convention to Visit Exhibit

R. B. Fisher
President

WITH heavy programs of construction and maintenance confronting the railways in the months immediately ahead, in which work equipment, power tools and modern materials must play an important part in the interest of the greatest efficiency and economy, members of the National Railway Appliances Association are looking forward optimistically to the 30th annual exhibit of their association in Chicago, on March 10-13, inclusive, coincident with the convention of the American Railway Engineering Association. Already 78 companies have arranged to exhibit their products, and, as set forth in the above letter from R. B. Fisher, president of the N.R.A.A., the representatives of these manufacturers look forward to the opportunity to discuss equipment and material problems with the readers of *Railway Engineering and Maintenance*.

As for the last two years, the exhibit will be held in the large and attractive International Amphitheatre, and the association will provide bus service between the convention hotel (the Palmer House) and the Amphitheatre during the exhibiting hours.

The exhibit will be open to visitors during four days, beginning on Monday, March 10, one day ahead of the A.R.E.A. convention, the extra day being provided to afford railway men maximum opportunity to study the individual exhibits without encroaching upon their convention activities. The hours during which the exhibit will be open on each of the days are as follows:

Monday,	March 10—	9:00 a.m.	to	6:30 p.m.
Tuesday,	March 11—	9:00 a.m.	to	10:00 p.m.
Wednesday,	March 12—	9:00 a.m.	to	6:30 p.m.
Thursday,	March 13—	9:00 a.m.	to	3:00 p.m.

The exhibit this year is being directed by R. B. Fisher (Buda Company), president of the association, and C. H. White (Industrial Brownhoist Corporation), secretary. A list of the companies that will participate in the exhibit, with their booth numbers, is presented here-

and Materials at Chicago

with, together with a floor plan of the International Amphitheatre, showing the various exhibit spaces and their respective numbers.

Exhibiting Members

Air Reduction Sales Company, New York....10-11
American Car & Foundry Company, New York....175-176
American Fork & Hoe Company, Cleveland, Ohio....174
American Hoist & Derrick Company, Minneapolis, Minn.... 72
Armco Railroad Sales Company, Middletown, Ohio.... 9
Association of American Railroads, Washington, D.C....
Aurora Railway Supply Company, Aurora, Ill....122
Barco Manufacturing Company, Chicago.... 29
Buda Company, Harvey, Ill....27-28-41-42
Caterpillar Tractor Company, Peoria, Ill....118-119
Chicago Pneumatic Tool Company, New York....73-74
Chipman Chemical Company, Bound Brook, N.J.... 4
Crerar, Adams & Company, Chicago.... 80
Cullen-Friestedt Company, Chicago.... 81
Dearborn Chemical Company, Chicago....38-39-40
deSanno & Son, Inc., A. P., Phoenixville, Pa....131
Dickinson, Inc., Paul, Chicago....113
Duff-Norton Mfg. Company, Pittsburgh, Pa....32-33
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Elastic Rail Spike Corporation, New York.... 18
Electric Tamper & Equipment Co., Ludington, Mich....101-112
Fairbanks, Morse & Co., Chicago....20-21-22-23-34-35-36-37
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.... 43-44-45-46-47-57-58-59-60-61
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Hayes Track Appliance Company, Richmond, Ind....134
Hogan, George M., Chicago....166-167
Holland Company, Chicago....141
Homelite Corporation, Port Chester, N.Y....177
Hubbard & Company, Pittsburgh, Pa.... 65
Industrial Brownhoist Corporation, Bay City, Mich.... 30
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Joyce-Cridland Company, Dayton, Ohio....75-76
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Metal & Thermit Corporation, New York....50-51
Morden Frog & Crossing Works, Chicago....25-26
Morrison Railway Supply Corporation, Buffalo, N.Y.... 78
Moto-Mower Company, Chicago....178
Murdock Mfg. & Supply Company, Cincinnati, Ohio....173
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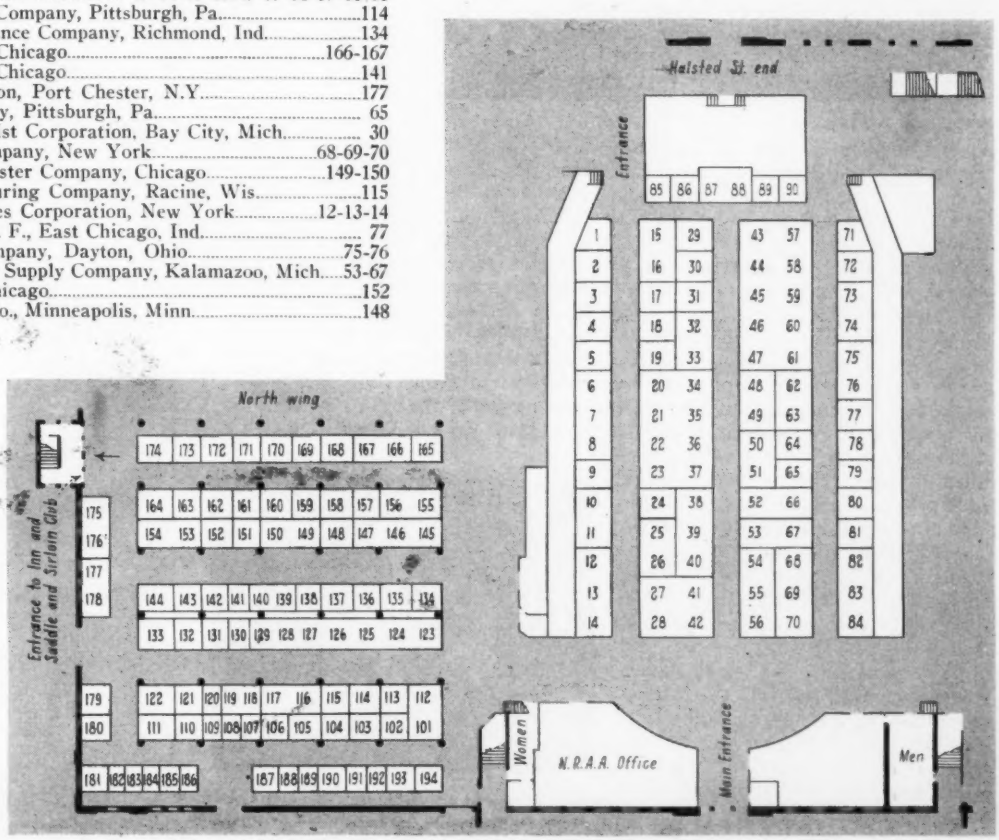
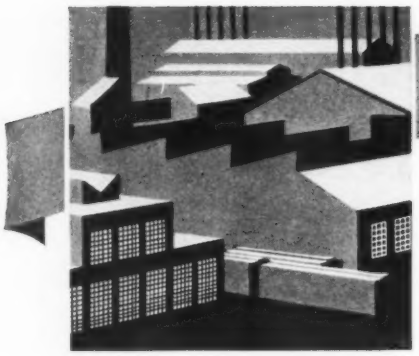
National Carbide Corporation, New York....10-11
National Lead Company, New York....157
National Lock Washer Company, Newark, N.J.... 19
Nichols, Geo. P. & Bro., Inc., Chicago....153
Nordberg Manufacturing Company, Milwaukee, Wis....
.... 123-124-125-126-127-128-129
Oxweld Railroad Service Company, Chicago....87-88
P. & M. Company, Chicago....62-63
Philadelphia Steel & Wire Corp., Philadelphia, Pa....132
Pocket List of Railroad Officials, New York.... 1
Portable Plating & Equipment Company, Chicago....143
Power Ballaster Company, Chicago....133
Rail Joint Company, The, New York....52-66
Railroad Accessories Corporation, New York....155-156
Rails Company, New Haven, Conn.... 17
Railway Engineering and Maintenance, Chicago.... 64
Railway Maintenance Devices, Inc., Chicago....154
Railway Purchases and Stores, Chicago....151
Railway Track-work Company, Philadelphia, Pa.... 79
Ramapo Ajax Division, American Brake Shoe & Foundry Co., New York....54-55-56
Republic Steel Corporation, Cleveland, Ohio....82-83-84
Sperry Products, Inc., Hoboken, N.J....144
Syntron Company, Homer City, Pa....116-117
Teleweld, Inc., Chicago....137
Templeton, Kenly & Co., Chicago....15-16
Timber Engineering Company, Washington, D.C....135
United States Wind Engine & Pump Co., Batavia, Ill.... 24
Woolery Machine Company, Minneapolis, Minn....139-140
Young & Greenawalt, Chicago.... 71



Floor Plan of the Exhibit



PRODUCTS of Manufacturers

Bethlehem Develops New Steel Crosstie

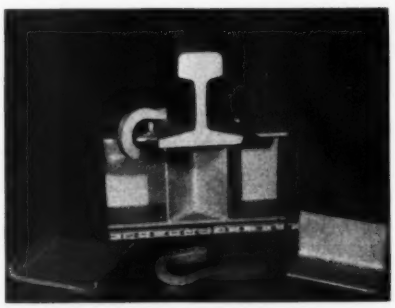
A METAL H-beam tie of simple design and with only four loose parts, has been developed by the Bethlehem Steel Company, Bethlehem, Pa., for use in mine and industrial tracks; it is known as the Anchor tie. The new tie is 8 ft. long and consists of a 6-in. H-beam weighing 15½ lb. per ft. The gage of the track is definitely fixed at the place of manufacture by two ⅜-in. double-shouldered tie plates, 5½ in. wide, that are arc-welded to the tie. Two 3-in. by 3-in. by ¼-in. angles are arc-welded in position directly beneath each tie plate between the two flanges of the beam to act as stiffeners for the tie and as retainers for the spring clamps by means of which the rails are fastened to the tie.

It is pointed out that the combination of beam, tie plate and angles forms a stiff pedestal construction at the point of maximum load. The spring clamps that are used for fastening the rails to the ties are said to have sufficient "give" to impart a resiliency to the track structure, thereby eliminating any detrimental effects that a rigid pedestal construction might have. Owing to the reinforcing effect of the welded tie plates and angles, it is claimed that the tie has unusual strength for light-weight construction. Furthermore, it is pointed out that there are no holes or notches in the tie section to weaken it at any point.

The clamps, of which there are four for each tie, are of heat-treated spring steel, and are driven into place with an ordinary spike maul or sledge hammer. As the hook end is driven into position at the base of the rail, the other end of the clamp snaps over the corner of the angle, a hump near the end preventing the clamp from slipping back. To further lock the clamp into position, the end engages the web of the tie, forcing the hump firmly against the angle. Also, as the nose of the clamp bears against the base flange of the rail, the loop produces a slight spring action which is said to impart the resiliency to the track structure that was mentioned above. To remove the clamp from the tie, a blow is struck with the spike maul against the hump, driving it back over the corner of the angle.

It is claimed that Anchor ties are easy to install and that they are economical to maintain. A total of 400 of the new ties have been tested for the last three years in a section of industrial track subjected to exceptionally heavy service. It is said that these ties have withstood lateral movement exceptionally well and that, after this three years service, the surface and alinement are still in almost perfect condition.

A Section of Newly-Laid Industrial Track Showing Anchor Ties in the Foreground.



This View Shows the Different Parts Used in the New Tie and Also How They Appear When Assembled

New Hy-Crome Pressure Spring

THE Reliance Spring Washer Division of the Eaton Manufacturing Company, Massillon, Ohio, has added to its extensive line of railroad Hy-Crome spring washers, a new washer, known as the Hy-Crome pressure spring. This new spring, which is being produced in 1-in., 1-1/16-in., 1⅛-in., and 1¼-in. bolt sizes, resembles many other spring washers in appearance, but is claimed to incorporate many refinements and im-

The New Hy-Crome Pressure Spring

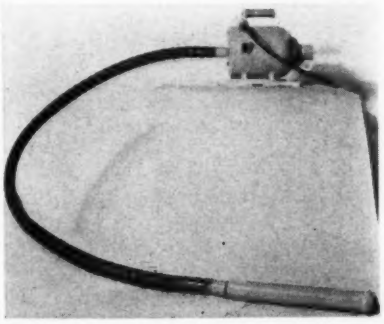
provements in the interest of insuring continuously tight joints under even the most difficult service conditions.

The new spring is said to be one of the strongest alloy spring washers on the market, the 1-in. size, for example, providing a closing load of approximately 20,000 lb., which is in excess of that of any of the other railroad spring washers produced by the company. The new Hy-Crome pressure springs have a wide range of reaction, with reactive values much greater than those required under the specifications of the American Railway Engineering Association. For example, the reaction of the 1-in. size springs, tested in accordance with A.R.E.A. specifications, is approximately 6,500 lb.

Jackson Concrete Vibrators

THE Electric Tamper & Equipment Co., Ludington, Mich., has recently developed two electric motor driven flexible shaft concrete vibrators, known as Models FS-4A and FS-5A.

Model FS-4A has a ⅝-hp. electric motor with an 18-in., 7-ft. or 14-ft. flexible shaft connected to a vibrator head 1¾ in. in diameter, which has a frequency of approximately 7,200 r.p.m. under full load. The FS-5A has a 1½-hp. motor which is available with or without a turntable base and can be furnished with flexible shafts 7, 14, 21 or 28 ft. long. The vibrator head used with this unit has a diameter of 2⅜ in., and operates at a frequency of approximately 7,200 r.p.m. under full load.



The Jackson FS-5A Concrete Vibrator Operates at a Frequency of 7,200 R.P.M.

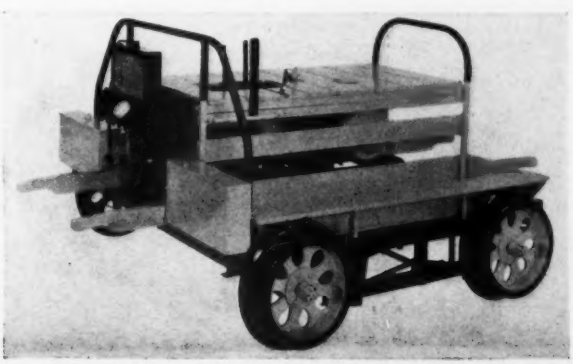
The motors of both vibrators are housed in aluminum alloy castings, which are provided with lifting handles. An eyelet is also provided on the Model FS-5A by means of which it may be suspended by a rope, cable or hook. The motors of both units have cooling fans, and air filters to keep out dust and dirt. They are specially designed to provide a proper vibrator frequency of maximum efficiency, with long life for ball bearings and working parts.

Four New Fairbanks, Morse Inspection Cars

FOUR new models of lightweight 1- to 4-man inspection cars have been added to the line of motor cars built by Fairbanks, Morse & Co., Chicago. The four new cars, designated as No. 56, No. 86, No. 756 and No. 786, are alike as regards chassis and body details but differ in the type of power plant and type of drive. Both the No. 56 and the No. 756 have water-cooled condenser-type motors, but the former has a clutch and roller chain drive, while the latter has a belt drive. Both the No. 86 and the No. 786 models, on the other hand, have air-cooled engines, with a large-capacity blower incorporated in the flywheel which is completely housed as a safety feature. The No. 86 has a clutch and roller chain drive and the No. 786 has a belt drive. The engines of all four models are of the horizontal, single-cylinder, two-cycle, two-port, reversible type and all have a 3¾-in. bore, a 3½-in. stroke, and develop 5 to 8 hp. The motors have a side outlet exhaust. The cars have five-gallon capacity gasoline tanks.

The chassis of all four models are 84 in. long, 64 in. wide, have a wheel base of 37 in., a seat in the center 24 in. by 46 in. and two tool trays, one on each side, each 14 in. by 49 in. The frames are constructed of alloy steel. Safety tread metal toe boards are provided and the cars are equipped with front and rear safety rails, rail skids, engine guards and tool boxes.

All four models weigh approximately 600 lb. and the lifting weight with the handles extended is about 100 lb. They are available with 14-in. wood center wheels, 16-in. one-piece welded wheels, 16-in. demountable-type wheels, or 17-in. wood center wheels. The wheels are mounted on solid axles, with differential front axles optional. The axle boxes are of fabricated steel, rubber-mounted, with Timken bearings and Alemite grease lubrication. The cars have self-centering brakes, with wooden brake shoes and aluminum brake shoe facings. Other special equipment which may be ordered for these cars include generators, storage batteries, head and tail lights, rail sweeps, canvas covers, canvas and steel wind shields, gongs, seat cushions and oil bath air-cleaners.



The Fairbanks, Morse No. 56 Motor Car Has A Water Cooled Engine and Chain Drive

New Mall Drill

THE Mall Tool Company, Chicago, has recently added to its line of portable electric drills the Model 583, ⅝-in. electric Malldrill, which is a general all-round drill for repair and construction work and which is recommended for ordinary types of heavy-duty drilling.

The Model 583 Mall-drill

The drill has a free speed of 560 r.p.m. and weighs approximately 18 lb. It consists of a universal motor for either 110-volt or 220-volt current connected to the drill chuck by heat-treated chrome-nickel alloy steel helical gears. The gears are incased in a grease-tight gear case and are not

keyed to the shaft, but instead are made in one piece and form an integral part of the shaft. This construction is said to eliminate backlash and the possibility of the assembly being out of balance. In addition, the gears are constructed so that three teeth, instead of the customary two, are in mesh at all times. The drill is also said to have strong over-capacity switches, deep groove ball bearings and a high grade precision chuck.

Nordberg Model BD Drill

THE Nordberg Manufacturing Company, Milwaukee, Wis., has developed a new power rail drill, Model BD, which is a compact one-man machine for drilling rails at joints, switches, guard rails and crossings, and which is simple in design, light in weight, and can be operated readily by ordinary track men.

The machine, which weighs 290 lb., consists of a 3-hp. single-cylinder engine connected to a drill spindle by a friction-driven gear reduction and a roller chain. The drill spindle has a rachet-lever feed. The unit is mounted on a frame with double flanged rollers, and a stabilizing bar extends to the other rail. A friction drive clutch is provided with a quick release, permitting the drill to be stopped without stopping the engine and also permitting the clutch to be disengaged when starting the engine. The pressure of the two friction members of the clutch is regulated by spring pressure and for that reason is said to be positive and always constant. Lifting handles are provided for lifting the machine.

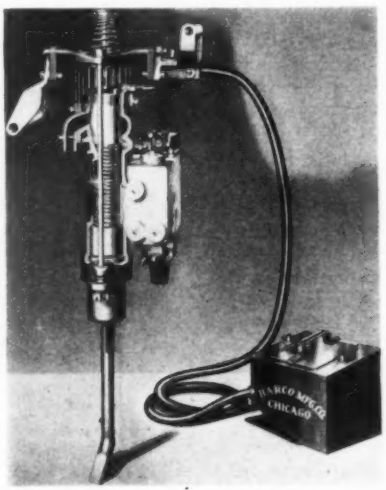
An outstanding feature of the drill is the simple chuck for holding the flat drill bit. This chuck consists of two tapered cylindrical pieces of hardened steel which, when inserted in the spindle, automatically and positively hold the bit from slipping. The chuck can be removed by a light tap on a pin provided for that purpose. No tools are required for its use and there are no threads to strip or loosen. The chuck will take bits for holes from ¾ in. to 1½ in. in diameter.

It is said that the machine can be quickly adjusted to the drilling position, that it will operate on either the inside or outside of the rail and in the close quarters found at switches.

The Nordberg Model BD Power Rail Drill

New Barco K-1-A Lightweight Tie Tamper

THE Barco Manufacturing Company, Chicago, has developed the K-1-A tie tamper, which supersedes the Model K-1 lightweight tamper and is adapted for tamping all types of ballast, crib busting, ice breaking, etc. The new



The New Barco K-1-A Unit Tie Tamper Weighs 59 lb. and Has A Larger Tank

tamper weighs approximately 59 lb. and is similar in design, although lighter than the TT-2 heavy duty tie tamper. The K-1-A differs from the K-1 in that, instead of a gasoline tank of hollow steel coils, it incorporates the same rectangular-shaped aluminum tank and the same carburetor that are used on the TT-2.

Like its predecessor, the K-1, the K-1-A consists of a tamping tool actuated by an air-cooled, 2-cycle, single-cylinder gasoline engine, in which a spring-returned piston is propelled downward by the explosion in the cumbustion chamber, striking an anvil which transmits the blow to the tamping bar. Lubrication is provided by mixing oil in the gasoline and ignition for spot tamping work is provided by a small portable battery which may be dragged behind the tamper by means of the connecting cable. Ignition for groups of tools in extra gang work such as out-of-face surfacing, may be provided by a portable gasoline-powered charger and storage battery unit.

The new tamper is said to have a better balance, which increases it's effectiveness as a tie tamping tool. The new gasoline tank enables it to operate twice as long between refillings of gasoline as the K-1, and a number of parts, including the gasoline tank and carburetor, are now interchangeable between the K-1-A and the TT-2, which is an advantage from the standpoint of maintenance and repair of the tampers.

International Trucks

THE International Harvester Company, Chicago, has recently developed a new line of trucks of ten models, five of light-duty type ranging in capacity from ½ ton to 1½ tons, and five of heavy-duty type ranging in capacities from 5 to 9 tons, all of which are designated as Model K.

The light duty trucks, known as the K-1, K-2, K-3, K-4 and K-5, have wheel bases ranging from 113 to 117 in. and gross vehicle weight ratings ranging from 4,400 to 13,500 lbs. They are powered by three sizes of the new Green Diamond engine, which are said to provide more power, with improved performance and remarkably greater fuel economy. The trucks are equipped with two-shoe, double-anchor-type hydraulic brakes and on the larger units, the K-4 and K-5, a new rear wheel Hi-Tork brake is employed.

Other important features of these new light duty trucks are roller bearing anti-friction universal joints, improved self-alining propeller shaft center bearings, rubber-cushioned, three-point engine mounting, rubber-mounted radiator, sealed beam headlights, mechanical shift starter, oil bath air cleaner, sturdy truck-type clutches and transmissions, easy-riding qualities, an all-steel comfortable cab with a quickly adjustable seat and back cushions and improved steering. The trucks also have new and distinc-

An International Model K-11, Which Has a Carrying Capacity of 18,000 Lb.

tive styling with conservative use of chromium trim; headlights mounted in gracefully curving, skirted fenders, and a sloping, V-type, one-piece windshield which gives excellent visibility. Standard bodies of many types are available in various sizes for each of the three lighter models. Standard stake, dump and other body types are available for the larger units.

The new heavy-duty truck models have gross vehicle weights ranging from 14,500 to 27,000 lbs., and wheelbases from 134 to 197 in. They are powered by five sizes of six-cylinder, valve-in-head engines, ranging from 84 to 114 hp. The engines have replaceable cylinders, a new mechanically-sealed water pump which requires no adjustment, a large-diameter distributor and a new type of universal heat range spark plugs. All models have Hi-Tork hydraulic brakes on the rear wheels, except the Model K-11 which is equipped with air brakes. The brake shoe anchors are diametrically opposite each other and on a forward stop both shoes divide the braking load equally. This results in considerably longer lining life, cooler brakes, less lining fade, and a uniformity of lining pressure that reduces noise, squeal and the likelihood of brake drum scoring. A vacuum power unit or "booster" is standard equipment on the models with hydraulic brakes and the capacity of the vacuum cylinders is considerably increased.

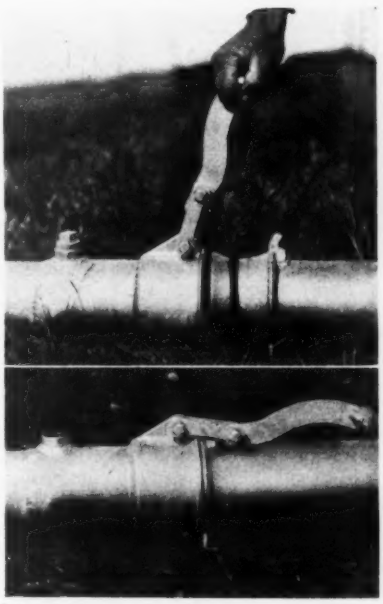
The steering effort is said to have been reduced as much as 50 per cent. The king-pin inclination has been reduced from eight degrees to four degrees, and the use of twin-lever steering gears gives better leverage. In addition, all models have ball bearings at the upper end of the steering wheel tube, and the three larger models have tapered roller bearings in the steering gear. Sweeping lines of the radiator grille, fenders and hood give the new Internationals a streamlined, distinctive but massive, heavy-duty truck appearance. Head lamps are of the sealed-beam type. The new cabs have more leg room and head room and improved vision. Three-point rubber-insulated cab mountings prevent cab side movement and twist. The cab windows are of safety glass.

The New Line of Light-Duty International Trucks Have Capacities Ranging from ½ to 1½ Tons

Calco Pipe and Couplings

THE Armco Railroad Sales Co., Inc., Middletown, Ohio, is now promoting its Calco portable pipe with rapid-action couplings in the railway field. This pipe is used for temporary compressed air lines in railway maintenance work, particularly for air lines in track surfacing work with pneumatic tampers.

Calco pipe is light in weight, weighing approximately one-third as much as ordinary standard pipe. It has a heavy galvanized coating and for this reason the extra wall thickness normally provided for protection against corrosion has been eliminated, resulting in its light weight, with strength ample to withstand all normal operating pressures. The ends of the pipe are designed for rapid-action coupling, in which only the operation of a lever is required to make the joint air- and watertight. The couplings are an integral part of the pipe, and gaskets used in the joints are the only parts requiring occasional replacement. Calco pipe is made in standard 20-ft. lengths and each length has a 2-in. outlet for tool connections. A complete line of various fittings and outlet connections are available and the pipes are made in various sizes and gages and in special section lengths, if required, to meet any need.



Above—A Joint and Lever in Open Position—Below—The Closed Joint

The use of Calco pipe is said to have a number of advantages. Because of

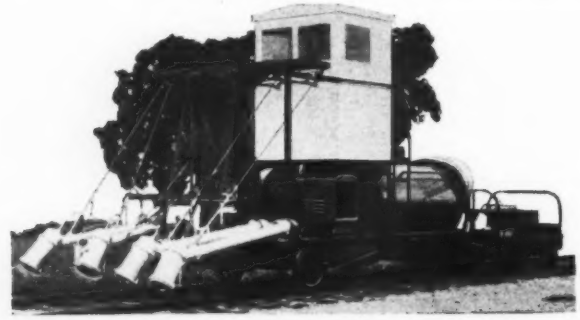
A Tamping Gang with Pneumatic Equipment Operated from a Calco Pipe Line

its light weight, any size of the pipe is easily handled and moved, and this, combined with the rapid coupling feature, makes continuous operation possible for distances of twice the length of the available pipe, by removing pipe at one end and adding it at the other end as the work progresses. An added advantage is the elimination of traffic hazards occasioned by the use of a mobile compressor on the track. Furthermore, the light weight of Calco makes it possible to use a pipe with a much larger diameter, which greatly reduces the pressure loss due to friction and increases the volume of air delivered, allowing cooler operation of the tools.

New Fairmont Weed Burner

A NEW weed burner, the M44 series A, has been designed by Fairmont Railway Motors, Inc., Fairmont, Minn., particularly for short line railroads and branch line work. The M44 is a rail-mounted unit consisting of four extension burner arms at the rear, a blower, a fuel pump and a fuel-loading pump operated by a 36-hp. Waukesha engine, an operators' cab and a 650-gal. distillate oil tank mounted on the head end. The burner is towed by a heavy-duty motor car.

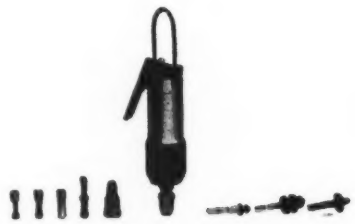
The burner arms are operated in pairs and can be swung easily from side to side and raised or lowered by controls in the operators' cab. With the burner arms in the center position, a 10-ft. swath can be burned. When each pair of arms is swung out, an additional 5 ft. can be burned on each side. Thus, the M44 series A can burn the crib section, the shoulders and out as far as 10 ft. from the center line of the track in two trips. The burner nozzles are cooled by the air from the blower; and, at the same time, the air is said to be preheated to produce economical combustion and an intensely hot flame. The operators' cab is constructed of a fireproof material and is designed to protect the men from heat caused by tail winds. Three men are needed to operate the M44, two to regulate the burner arms and one to run the motor car.



The Fairmont M44 Series A Weed Burner

I-R Small Grinder

THE Ingersoll-Rand Company, New York, has added a small air grinder that weighs only 1¼ lb. to its line of pneumatic tools. The new tool is of the Multi-Vane type and is known as size 00. It operates at 20,000 r.p.m. under a pressure of 90 lb. per sq. in.



The Size 00 Grinder and the Different Attachments That Are Available for Use With It

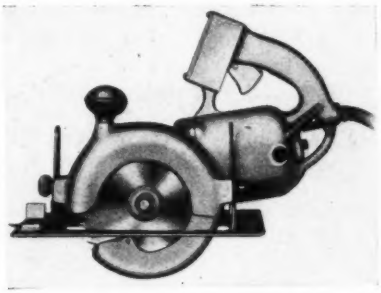
The unit is built to operate with Organic Bonded wheels 1½ in. in diameter or with Vitrified wheels 1¼ in. in diameter.

Also available for use with the tool are various sizes of collets to take mandrel-mounted grinding wheels or small twist drills. Although it was originally intended for use as a die grinder for tool room and bench work, it is said that the new tool is being used for light grinding jobs wherever metal must be removed from places difficult to reach.

Syntron Model 25-S Saw

A NEW rotary electric saw, Model 25-S, which is adapted to railway bridge and building work and which can also be equipped with a thin abrasive disc for scoring or slotting work, has been placed on the market by the Syntron Company, Homer City, Pa. This model has an oversize, universal electric motor for operation on either a.c. or d.c. current. The motor drives the arbor shaft on which the saw blade is mounted, by means of silent worm gears. Precision ball bearings are used; three on the motor shaft and two on the arbor shaft. The saw blade is totally enclosed in a telescoping safety guard.

The Model 25-S weighs 19 lb. and is said to be well balanced and easy to handle with one hand. It has a vertical cutting capacity of 2½ in. and a bevel cutting capacity at an angle of 45 deg. of 1¾ in.



The Syntron Model 25-S Has A Cutting Capacity of 2½ In.

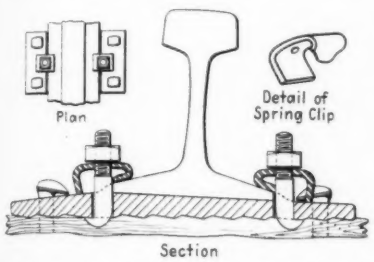
Lundie Spring Clip Assemble

A SPRING clip assembly with specially-designed spring clips and square shanked bolts for application with double shouldered tie plates, has been developed by the Lundie Engineering Corporation, New York, to secure the rail to the tie plate, permit wave action of the rail under taffic and reduce the pumping of ties. The spring clips are designed with a double spring action, obtained through the cambered top and circular bend of the rail-bearing area. The end of the clip has a radius lip-bearing area which is said to eliminate rocking of the spring clip and cutting of the rail base due to wave action or motion of the rail. The inside lip of the clip bears against the square shank of the bolt, preventing the clip from turning.

The bolt has a radius on the head end to permit insertion without disturbing the tie plate. Its square shank fits the hole in the tie plate and prevents the turning of the bolt in the hole. The bolt is inserted in the spike hole of the plate and a slight blow will set it upright in position for applying the spring. The Lundie springs may be used in the center of the plate or staggered and the plate fastened to the tie with screw or cut spikes.

This type of clip fastening is said to eliminate creepage in either direc-

tion and effectively hold the rail in place for welded track construction, or joints may be laid tight, minimizing battered rail ends and affording smooth, quiet track. Mechanical wear



A Sectional View of the Lundie Tie Plate and Spring Clip Assembly

of the tie is also said to be reduced, and the rails may be renewed without disturbing the tie plate. An installation of these springs has been in service on the New York, Ontario & Western for two years, where it is reported to be holding the rail in place, eliminating the use of spikes along the rail base and holding the track against rail creepage.

Buda Rail Inspection Tow Car

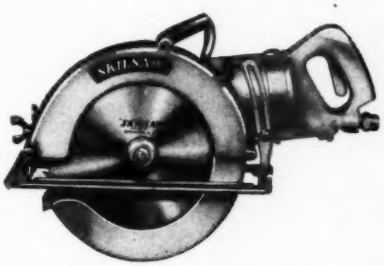
THE Buda Company, Harvey, Ill., has constructed a new tow car designed for rail detection work. The car is 21 ft. 6 in. in length and 8 ft. wide in inside width. It is powered by a Buda-Lanova 6-DT-468 automotive-type Diesel engine with a selective bus-type transmission for four forward speeds and one reverse. In addition, a reverse gear shift permits selection of either forward or backward direction.

All controls, gear shift levers and a complete instrument panel are located at the operator's seat at the front on the left side. Another seat is placed in the front on the right side, and the rest of the interior space is available for working room. Other equipment in the car consists of a large double water tank in the rear, two locker cabinets, a large work table and a compartment for tools, etc.

The body of the car is streamlined and is of all-steel double-wall construction. It is completely padded from its chassis by live rubber insulation. Sliding doors are located on each side of the car. The chassis consists of an 8-in. channel-steel, electrically-welded frame, with heavy duty wheels, 3-in. axles and Timken axle bearings. All wheels are equipped with air brakes and the frame is supported on wide, leaf-type springs with Buda thrust plates.

New Pneumatic Skilsaw

SKILSAW, Inc., Chicago, has produced a new model pneumatic rotary handsaw with a 12-in. blade, known



A Model 2127 Pneumatic Skilsaw

as the Model 2127, which is adapted for square cutting of heavy timbers up to thicknesses of 4⅜ in. and for bevel cutting lumber up to 3-5/16 in. thick at an angle of 45 deg. The Model 2127 has a net weight of 30 lb., and an overall length of 22 in. It is driven by a pneumatic rotary-type motor designed for operation on 80 to 100 lb. of air pressure, and requires approximately 75 cu. ft. of free air at its maximum capacity. The motor drives the saw blade at a free speed of 1200 r.p.m., and a blower keeps the line of cut clear of sawdust. The saw is provided with a base adjustment for vertical cuts from 2⅜ in. to 4⅜ in. deep or for bevel cuts at any degree of angle desired. The unit is incased in die-cast aluminum.

The Model 2127 is precision-made of quality materials. High grade ball bearings are used throughout. All shafts and load-bearing members are made of chrome-nickel alloy steel, specially heat treated for greatest toughness and the shafts are mounted on highest quality ground and lapped, radial and thrust bearings. The bearing seats are ground to limits of 0.0004 in. The Skilsaw blades are said to be made of the best quality crucible steel, accurately fitted and with a mounting that entirely eliminates loss of power from slipping.

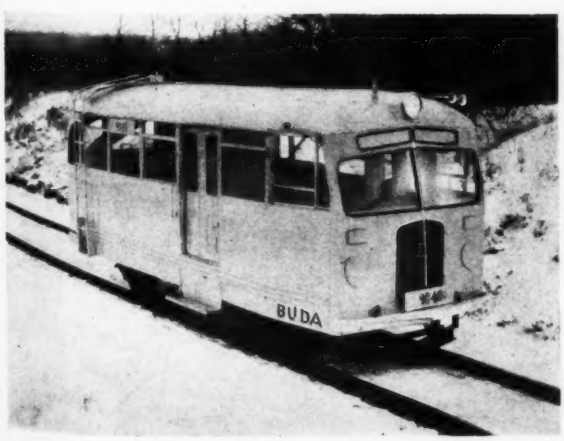
New Spot Tamper

THE Chicago Pneumatic Tool Company, New York, has developed a portable air compressor which is especially designed for spot-tamping work. The new unit is a four-tool machine with a capacity of 60 cu. ft. per min. at a pressure of 100 lb. per sq. in. It is powered with a four-cycle gasoline engine, and both the engine and the compressor are air-cooled. To achieve ready portability, the unit is mounted on two wheels which are fitted with pneumatic tires.

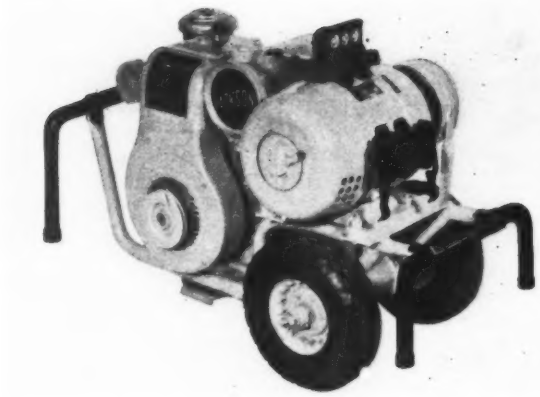
Jackson Portable Power Plants

THE Electric Tamper & Equipment Company, Ludington, Mich., has developed two new portable power plants, the WS-2 and the WS-8, and has made a number of improvements in the WS-4. These units have been specifically designed as portable power plants for railway track and bridge and building work.

The WS-2, the lightest of the three, is a two-tamper unit which weighs 225 lb. It has an output of 1¼ k.v.a. of 110-volt, 3-phase, 60-cycle a-c. current, and has single phase outlets for other tools and lights. It consists of a gasoline engine and generator, compactly mounted on a wheelbarrow-type frame, with a large pneumatic wheel. It has a height of 27½ in., a length of 37 in. and a width of 17 in. across the power plant and 21½ in. at the handles.



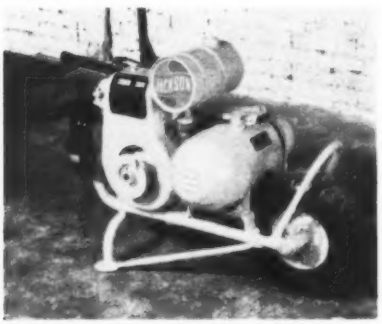
The New Buda Rail Inspection Tow Car



The WS-4 2- to 4-Tamper Capacity Jackson Portable Power Unit

The WS-4 has been improved by increasing the engine capacity 0.7 hp., by improving the frame design, making it stronger and more streamlined, and by making the single phase adapter with three outlets integral with the 3-phase connector plug mounted on the generator. The latter improvement has eliminated the possibility of loosening the separate adaptor, with which these machines were formerly equipped.

The WS-4 is a two- to four-tamper unit, which weighs 375 lb., but has a lift at the handles of only 64 lb. It has a capacity of 2 k.v.a. of 110-volt, 3-phase, 60-cycle a-c. current. It has a single cylinder, 4-cycle, forced-draft, air-cooled gasoline engine, which operates at a normal speed of 2200 r.p.m. The engine is connected to the generator by a V-belt drive. The entire unit is compactly mounted on a metal base with two pneumatic wheels in front and a pedestal-type leg in the rear. It also has a double-flanged wheel, which makes it easily portable on the track.



The WS-2 2-Tamper Capacity Jackson Power Unit

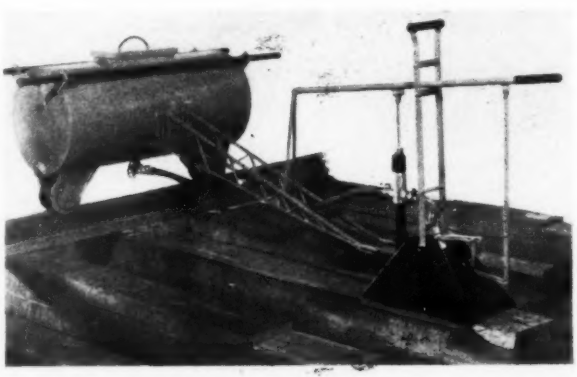
The WS-8 is a heavy-duty, 8- to 12-tamper power unit, which weighs 755 lb., with a lift at the handles of only 70 lb. It has a four-cylinder, air-cooled Wisconsin-type VE-4 engine. It is said that the normal output of the engine is about 12 hp. for the generation of 5 k.v.a. of 110-volt, 3-phase, 60-cycle a-c. current, but that it has a large horsepower reserve for running electric vibrators or other tools at higher speeds than 60 cycles will produce. A special generator is also available for an output with a frequency of 90 cycles. The machine is compactly mounted and has two large pneumatic wheels and a pedestal type leg. Lift handles are provided at both ends.

Woolery Creosote Spraying Machine

THE Woolery Machine Company, Minneapolis, Minn., has developed a creosote sprayer machine for use on newly-adzed ties in rail relay work, which provides an efficient method of applying the creosote uniformly to the newly-adzed surfaces. The machine is operated by two men, one pushing the tank along the track and the other jumping the spray hood from tie to tie, in a manner similar to the operation of an adzing machine.

The operation of lifting the hood by the handle works the pump and draws in a metered charge of creosote. The operation of pushing the handle down forces the creosote out through a nozzle in a heavy fan-shaped spray, which sweeps through the arc of a circle, co-incident with the downward movement of the handle. Both the stroke of the pump and the arc through which the nozzle swings may be adjusted independently so that either a large or small volume of creosote may be applied to either a long or short adzed surface.

It is said that two men can do a first class job of applying creosote with this machine at the rate of two ties per second. There is no waste of creosote, even on windy days, and it does not come in contact with the workmen's hands and clothing.



The Woolery Creosote Spraying Machine

Guaranteed Split-Proof Shovel Blade Edges

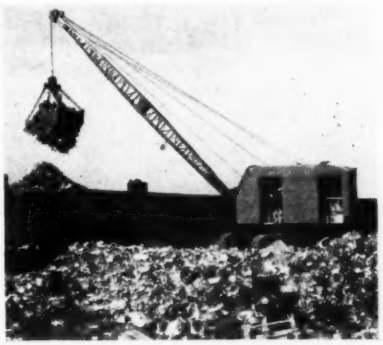
THE Ingersoll Steel & Disc division of the Borg-Warner Corporation, New Castle, Ind., now guarantees the blade edges of its Ingersoll shovels to be split-proof. These shovel blades are made of Tem-Cross Tillage Steel, which is double- or cross-rolled and carefully heat-treated. The cross rolling is said to give the steel an inter-

Two Types of Ingersoll Track Shovels. Left—With Plain Back—Right—With Solid Shank

locking mesh grain structure, which makes it split-proof. These shovels are available in Alloy, A, B or C grades of steel as specified, the first three grades and most of the C grades being heat-treated.

Model 75 Convertible Shovel-Dragline-Crane

THE Link-Belt Speeder Corporation, Chicago, has developed a light weight ¾-yd. convertible crawler shovel-dragline-crane, Model 75, as a companion model to its LS-85 heavy-duty ¾-yd. machine. In the model 75, all-



The Lightweight Model 75 Convertible Shovel-Dragline-Crane

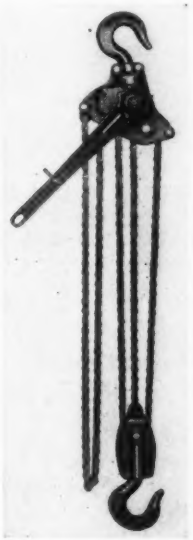
welded steel construction has been used to replace castings. The power plant is a heavy-duty gasoline or Diesel engine with a roller chain drive. Alloy steel, machine-cut spur gears drive the reverse and drum shafts, which turn in heavy bronze bearings. The machine has external band clutches and external band brakes. All brake bands are accessible and can be easily adjusted or removed for re-lining.

The Model 75 has a large-diameter turntable made of alloy steel with an internal gear. The roller path is machined on a bevel for large, wide-faced conical rollers that are said to revolve without slippage. Long, wide crawlers are said to give the machine extra stability on slopes and in heavy digging. The crawler shores are lug-driven with close pin centers to insure smooth action. They are said to be abrasion-resisting and non-clogging. The crawler shoes operate on double-faced track rollers, which increases the effective crawler width. Track adjustment for alinement and tension is provided at both ends.

Controls operated from within the cab permit steering, either gradual or sharp, in both directions, regardless of the relative position of the cab and lower base. A positive lock engaging in three positions prevents movement of the crawlers while working, eliminating any necessity for chocks or blocking. The Model 75 is said to be designed with speeds suitable for present-day demands, assuring high yardage at low cost. The external band clutches are said to enable the operator to "feel" the load at all times and these, plus the external band brakes operated by automotive-type pedals, are said to result in perfect control of the load and great accuracy in placement.

New Pul-Lift Portable Hoist

A NEW addition has been made to the line of Pul-Lift portable hoists manufactured by the Yale & Towne Manufacturing Company, Philadelphia division, Philadelphia, Pa. The new hoist has a capacity of 4½ tons; hence Pul-Lift hoists are now available in capacities ranging from ¾



The New Yale & Towne Portable Hoist Is Said to Combine Light Weight with Great Strength

ton to 6 tons. It is said that the new unit incorporates the same safety and construction features as previous models, and that it combines light weight with great strength, this being attributed to the use of new-type alloy steels in the construction of the hoist. As in other Pul-Lift hoists, the roller chain in the new hoist is specially designed and is said to have an ultimate strength nearly five times the rated capacity of the hoist.

A feature claimed for the new hoist is that it will operate equally well in the horizontal or vertical position; thus it can be used for pulling as well as lifting jobs. It also incorporates Yale Safety hooks which, in the event that a severe overload is applied, open slowly without fracture, thereby, it is said, giving a visual warning of danger and affording a positive means of protection for the operator, the load and the mechanism.

The new hoist is operated by means of a ratchet handle with a universal action, which is said to adapt it for operation in cramped quarters. It is pointed out that the hoist can be actuated by short strokes of the handle at any point within a complete circle. By means of the self-actuated load brake with which the hoist is equipped, it is said that the possibility of the handle flying about is reduced to a minimum.

Two New Stanley Sanders

STANLEY Electric Tool Division of the Stanley Works, New Britain, Conn., has produced two new electric sanders, No. 72 and 92, which are designed especially for continuous heavy-duty service on construction and repair work such as sanding wood and metal, scouring and polishing work.

Sander No. 72 has a 7-in. diameter disc, weighs 17¼ lb. and has a free speed of 4200 r.p.m. Sander No. 92 has a 9-in. diameter disc, weighs 18 lb. and operates at a free speed of 3300 r.p.m. Both sanders are equipped with ventilated universal motors for operation on either a.c. or d.c. current. The motors use 10 amp. at 115 volts and the grinders may be ordered with motors for operation on 115, 125, 150, 220, 230 or 250 volts. The working parts are incased in strong aluminum alloy housings. Sealed-type ball bearings are used on the armature and spindle and the spiral gears are constructed of heavy-duty nickel steel. Operation is controlled by a totally enclosed double pole switch.

The sanders are equipped with a bevel-type flexible pad and are fur-

A New Stanley Sander

nished with six abrasive discs, three for metal and three for wood, wrenches, and a heavy rubber-covered three-wire cable. Other accessories available include a felt rubbing pad, a lamb's wool polishing bonnet and pad, and a wire torque brush. Flare

cup-grinding wheels may be used for smoothing welds and for surfaces where considerable metal is to be removed. It is said that the full ball bearing construction, precision gearing and dynamically balanced armature insure long service.

I-R Light Drills

TWO new air drills, known as sizes 00 and 0, have been added to the line of Multi-Vane pneumatic tools manufactured by the Ingersoll-Rand Com-

The Size OOL Non-Reversible Multi-Vane Drill With Pistol-Grip Handle

pany, New York. These are small light-weight tools, weighing only 1½ to 2⅞ lb. By means of numerous attachments that are available for use with the drills, they can be adapted for such operations as light screw driving, nut running, close-quarter drilling, wire-brushing, sanding, etc. They are available with either straight, lever-throttle or pistol-grip handles.

Morden Security Split Switch

IN the interest of greater safety under present-day high-speed train service, the Morden Frog & Crossing Works, Chicago Heights, Ill., has developed what it has designated as its "Security" split switch, the outstanding feature of which is the switch plates employed, which have a ⅞-in. height of riser and a hooked clamp which extends over the gage side of the stock rail base for approximately 1 in. and for the full width of the plate, insuring that the inside of the stock rail is held down securely at all times. Furthermore, these plates are milled precisely from solid plates and provide a rail seat cant of 1 in 40. The switch is regularly furnished with Samson heavy-duty switch points and undercut stock rails; is equipped with Morden Security adjustable braces on ties in accordance with the latest A.R.E.A. switch plans, and with malleable iron adjustable clamps on the remaining ties.

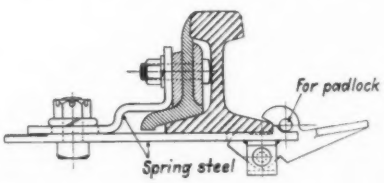
Owing to the extra height of riser on the plates, a heavier rail section, but less in height, is used in the switch points than in the turnout generally. For example, where the turnout rails are of the 112-lb. RE section, 130-lb. PS rail is used in the switch points. The running surface of the points is exactly the same as that used in standard switch construction. In addition, the heel end of the heavier switch point is planed to fit the lighter turnout rail, eliminating the necessity of using compromise joint bars.

A High-Speed Split-Angle Security Turnout on the Wabash at Lodge, Illinois

Automatic Switch Point Lock

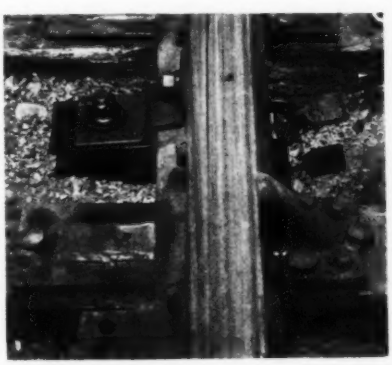
A SIMPLE mechanical device has been developed by the Rails Company, New Haven, Conn., which is attached to the normally-closed switch point to provide an automatic switch point lock. The lock holds the switch in its normal position at all times and prevents accidents or derailments due to wheels splitting the switch, even though the switch stand may be damaged or broken off. It consists of two pieces of flat spring steel plates bolted together with a foot-operated locking latch attached to the outside end of the lower plate.

The upper plate is bolted to the gage side of the switch point and is



Showing the Closed or Locked Position of the Switch Lock

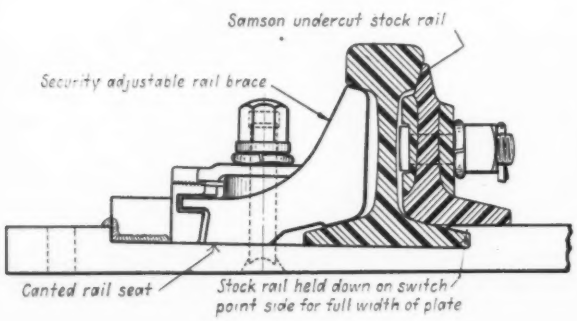
bent to clear the lower flange of the point. The lower plate extends under the base of the stock rail, and the locking latch engages the outside



An Installation View of One of the Automatic Switch Point Locks

flange of the rail under the base of the stock rail. The two pieces of spring steel are joined by an adjustable bolted connection, and the upper piece is shaped to provide a constant spring pressure of the lower plate against the base of the rail, which holds the latch in the engaged position when the switch point is closed.

The switch lock is made in two sizes, No. 1 for rail with a base 5½ in. wide or less, and No. 2 for rail with a base width of more than 5½ in. It is installed on the normally closed switch point between two


Samson undercut stock rail
Security adjustable rail brace
Canted rail seat
Stock rail held down on switch point side for full width of plate

Section Through a Security Switch Point at the End of the Point, Showing Details of the Switch Plate Construction

switch ties as near the point as possible, without interfering with other switch connections. A hole in the locking latch permits the use of a padlock if desired.

To operate the switch, all that is necessary is to push down on the foot lever of the latch and then operate the switch stand lever in the normal manner to throw or open the switch. When the switch is returned to its normal position, the switch lock automatically snaps into the locked position.

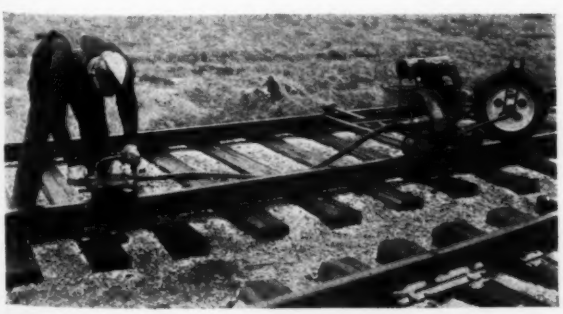
Nordberg Utility Grinder

A NEW development of the Nordberg Manufacturing Company, Milwaukee, Wis., is its Model UG utility grinder, an all-purpose machine which can be adapted with various accessories for such tasks as beveling rail ends, grinding welded rail, removing mill tolerance or flow from switchpoints and stock rails, opening flangeways, doing miscellaneous grinding at frogs and crossings, and boring holes for cut or screw spikes.

The Model UG consists of a 5-hp. single-cylinder gasoline engine and ball bearing-mounted friction drive, connected to the grinding head or other accessory by means of a flexible shaft. The engine and drive can be fully revolved on the supporting carriage. The friction members of the drive are held in contact by means of a compression spring which allows the drive to slip if the wheel should become snagged, and the drive can be released instantly by means of a convenient lever.

The carriage has two double-flanged rollers and an outrigger extending to the opposite rail, which provide for propelling the unit on the track. In addition, a large wheel with an oversized pneumatic tire is provided for off-track operation, by means of which the grinder may be moved like a wheelbarrow on the ballast or embankment shoulder.

The unit is compact and it is said that its balanced construction permits of greater operating convenience and ease of handling. The full revolving feature of the power unit permits the flexible shaft to be kept in a straight line, greatly lengthening the life of the shaft. When set in the intertrack space, there is ample clearance for passing trains.



The Nordberg Model UG Utility Grinder

New American Locomotive Cranes

THE American Hoist & Derrick Company, St. Paul, Minn., is building two new 40- and 50-ton locomotive cranes in which it has incorporated a number of developments which improve operation and step up the speed of these units as compared to older models. Two of the outstanding changes are the use of a three-speed transmission and the attainment of high lifting capacities at long radii with a crane of minimum weight by building up the boom of high tensile strength alloy steel electrically welded, which eliminates dead weight while retaining full strength.

The new 40- and 50-ton American locomotive cranes, Models 408 and 508, respectively, are powered with gasoline or Diesel engines with a chain drive to an intermediate shaft. An air-operated main clutch of the outside band type is provided on the intermediate shaft. All clutches have compressed air control and are extremely easy to get at for adjustment. The travel clutches are a heavy duty type.

A shift lever is provided in the lever bank at the operator's position, by means of which the swinging and hoisting mechanism can be thrown out of gear so that only the travel gears will be turning when the machine is traveling, which eliminates considerable wear on the swinging and hoisting mechanism. Anti-friction bearings are used throughout except on two slow-speed shafts. The shafts are nickel chromium steel, turned and ground, and all gears have cut teeth and are heat-treated carbon or alloy steel.

A Late Model American Locomotive Crane

The machinery deck consists of structural steel shapes, welded into a solid unit. It revolves on large conical steel rollers, running between two machined steel roller paths. Gib ring construction prevents the machinery deck from rocking or teetering. The car body is all steel of welded, one-piece construction and complies with the A.A.R. standards in all respects. It is mounted on two four-wheel trucks of 150,000-lb. capacity. A three-speed transmission of the selective type is controlled from the cab and provides a speed range of 2, 7 or 15 miles per hour. Shifting from one speed to the other is accomplished without stopping the machine. The transmission gears are roller bearing mounted and are enclosed and run in oil. The travel gears can be easily thrown out of mesh when the crane is to be hauled in a train. The cranes can be ordered with a generator and electric drive and also with a generator for the operation of an electromagnet.

The new cranes are said to be de-

signed for heavy-duty continuous operation and to have easier operation and greater speed. The hoisting speed with 17,000 lb. on a single line is 200 ft. per min., and the slewing speed is 3.15 r.p.m. The cranes have a draw bar pull of 11,000 lb.

New G-E Tri-Clad Motors

THE General Electric Company, Schenectady, N.Y., is superseding its entire line of a-c polyphase induction motors with a new line of

One of the New Tri-Clad Motors

motors, named Tri-Clad, which are adapted to railway water service requirements. The new motors have three principal features: better mechanical protection through the use of a cast-iron box-type frame; better electrical protection made possible by Formex, a new type of magnet wire; and better protection against operating wear and tear through a new design of sleeve bearings.

The Tri-Clad motors have a streamlined appearance, with few recesses or projecting parts and the end shields are enclosed above the center line, minimizing contact of vital motor parts with foreign matter, such as lubricants and other liquids. A double-end system of ventilation is employed. Integrally-cast rotor fans draw ample low-velocity air through the lower portions of each end shield, which impinges immediately against the coil extensions, resulting in low temperatures at both ends of the motor.

The motor windings, which are wound on a cast-aluminum rotor, are protected by the use of Formex magnet wire, developed by General Electric after 10 years of research. Formex is a tough heat- and solvent-resisting magnet wire with an insulation film. Abrasion tests of Formex are said to have shown a superiority of three-to-one and aging tests a superiority of 30-to-1, as compared with ordinary enameled wire. It has eliminated the older type of fibrous materials which absorb moisture and which deteriorate over a period of years, due to the effect of heat and chemical agents. The motor windings are further protected by the application of a synthetic-resin varnish and a covering coat of Glyptal red. In addition to providing better electrical insulation, the use of Formex has permitted a design of the motors for improved thermal capacity without reducing the space available for active materials.

The new sleeve bearings for the Tri-Clad motors are designed with the proper proportion of length to diameter, based on a consideration of the deflection of the shaft under load inside the bearing. Furthermore, a spiral grooving was developed to give assurance of oil distribution under severe operating conditions. A pressure relief system of greasing for ball-bearing Tri-Clad motors has also been developed.

New 1- to 1¼-Yard Shovel

THE Model LS-100, a new 1- to 1¼-yd. convertible shovel-dragline-crane, has been added to the line of shovels and cranes manufactured by the Link-Belt Speeder Corporation, Chicago, for which a number of advancements are claimed. The outstanding new feature is said to be the use of a new type of clutch to attain results never before attained by friction clutches, and a booster system that is said to give the operator the "feel" of the load at all times.

The LS-100 is powered by a heavy-duty industrial-type gasoline or Diesel engine. It has fully-enclosed travel brakes controlled from the cab, fully enclosed traction gears running in oil, anti-friction bearings throughout and a 72-in. diameter turntable with self-aligning rollers which operate on a machine-finished roller path. The crawlers are a smooth, self-cleaning type with track shoes 24 in. wide (or 30 in. optional).

It is said that sturdy construction has been particularly stressed in the design of the LS-100. Welded steel design has been used to increase strength and resistance to shock loads and provide positive alinement of machinery parts. The machine is controlled by easy-throw levers and may be quickly converted to a shovel, dragline or crane.

The Link-Belt Speeder LS-100 Convertible Shovel

Twin-Cylinder Homelite Generator

THE Homelite Corporation, Port Chester, N.Y., has developed a twin-cylinder portable generator for use as a power unit for operating portable

One of Four Portable Twin-Cylinder Homelite Generators, Which Were Used at Night for Repair Work and Floodlighting on This Emergency Bridge Repair Job

electric tools on many types of railroad maintenance work and as an emergency source of light. The generator weighs 130 lb. and has an output capacity of 3000 watts. It consists of a built-in twin-cylinder gasoline engine directly connected to a generator, and is mounted on spring-type

supports to lessen vibration and damage from outside disturbances.

The entire unit is very compact and two men can easily carry it. It is said that it has completely automatic operation, that the voltage remains at 110 regardless of the load, and that practically no manual attention is necessary for its operation.

Improvements in Flex-Toe Claw Bar

THE Warren Tool Corporation, Warren, Ohio, has redesigned its Flex-Toe claw bar so that track men can place it on a spike and manipulate it in the same manner that they formerly used the conventional type of claw bar. The changes incorporated involve a change in the angle of the toe so that the handle of the claw bar may be held in an inclined position, instead of vertically, when applied to the spike. In addition, the use of high grade steel and proper design have permitted the bar to be lightened to the same or less weight than ordinary claw bars.

The Flex-Toe claw bar is similar to other claw bars with the exception of the gripper jaws or toes, which operate automatically to grip the shank

Close-up of the Flexible Toes on a Flex-Toe Claw Bar

of a spike or drift bolt. The gripper jaws are made of high strength forged and heat-treated alloy steel. A number of advantages are claimed for the Flex-Toe: it is a one-man tool and no helper is necessary; it pulls all spikes and bolts, whether brine-eaten or headless; driving with a spike maul to set the claw bar is unnecessary; the gripper toes automatically take hold anywhere along the shaft of the spike or bolt, permitting them to be pulled out straight by taking a series of bites; the claw bars require no shop redressing, and only the toes need be replaced, which can be done in the field; the toes have a long life.

Improved Trego Switch Point Guard

THE Morrison Railway Supply Corporation, Buffalo, N.Y., has announced an improved Trego switch point guard, which consists of a short section of fabricated rail, similar to a guard rail, a tie plate, two filler blocks and two bracing plates, all welded together into one unit. It is applied to the gage side of the rail opposite the switch point to be protected, 20 in. from the end of the switch point. The tie plate is slipped

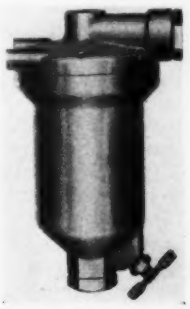
An Installation View of a Trego Switch Point Guard

under the base of the rail and the unit is bolted to the rail through the web by two 1-in. or 1¼-in. bolts. All wearing surfaces of the Trego are hard-surfaced. In its operation, it draws the trucks away from the switch point it protects. It is also said to tend to hold the track to gage.

Drain for Air Lines

A NEW automatic water drain for use in compressed air lines, known as type HOD, is being marketed by the DeVilbiss Company, Toledo, Ohio. This drain, which is available with four different fitting assemblies, is intended for installation in air lines, on air compressing outfits, or on air receivers. By automatically draining moisture from air lines or air receivers, the device prevents water from being carried into the tools and is said to assure a supply of air free of moisture.

The new drain is operated automatically by a slight fluctuation of the main-line air pressure. It is said that a variation in the pressure of as little as five pounds per square inch is sufficient for its operation. A manually-operated drain is provided for use during periods when the main air line is not in use. All of the copper tubing, hand valves, brackets and connections needed for the installation of the drain are said to be



The New DeVilbiss Type HOD Automatic Water Drain for Compressed Air Lines

included in each of the four fitting assemblies that are available with it.

It is pointed out that the new drain is especially desirable for use in connection with spray-painting work, where it is said to provide assurance against the possible deposit of moisture on freshly-finished surfaces.

Improvements in Centaur Mower

THE Centaur Company, Greenwich, Ohio, has made a number of improvements in the 1941 Model RW Centaur mower, which increase its adaptability for heavy-duty right of

A Model RW Centaur

way mowing. The idler pulley for the cutter bar take-off, which formerly extended below the level of the operator's platform support, has been raised, so that the low points of clear-

ance are now the bottom of the operator's platform support and the front axle. This change has increased the effective vertical clearance of the machines without raising the center of gravity, and has eliminated the possibility of hidden obstructions on the right of way breaking or damaging the idler pulley. In addition to this improvement, other changes have been made in construction and design to strengthen the knife connections.

The Centaur RW mower is a rubber-tired tractor unit with a cutter bar on one side, which will mow at any angle from vertical to 45 deg. below horizontal. A feature of the mower is a vacuum power cutter bar lift, which greatly simplifies the operation. A touch on a lever quickly lifts the cutter bar above visible obstructions. When a hidden object is struck, the cutter bar is automatically released and swings parallel to the mower. Another feature is a special design of the cross-head arrangement, whereby the power thrust of the mower pitman is always normal to the plane of the cutter bar, which is said to eliminate pounding, shock or strain on the engine, driving mechanism, or cutter bar and undue wear on the knives.

New Mall One-Horsepower Track Grinder

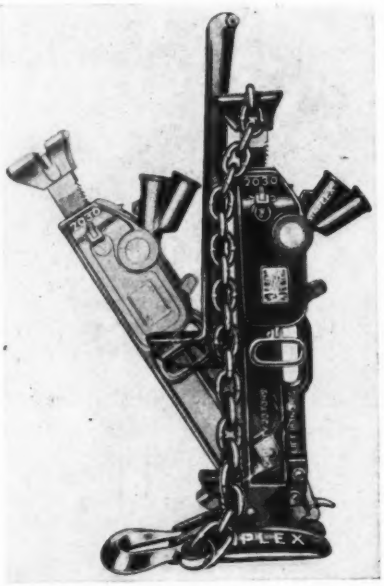
THE Mall Tool Company, Chicago, has developed a one-horsepower track grinder for grinding and cleaning to remove rust, corrosion and mill scale in preparation for the application of welded-type signal bonds to rails. The grinder consists of a 1-hp gasoline engine with a direct drive, connected to a flexible shaft 6 ft., 7 ft. or 12 ft. long as required. The unit may be equipped with an outrigger mounting for track operation, or with a low, round anti-creep, swivel base mounting with a carrying handle. It weighs 90 lb. with the outrigger mounting and 55 lb. with the swivel base mounting.

The engine is air-cooled, has gas control and an air cleaner. The oil capacity is 1⅓ pints and the gasoline capacity is 2 quarts. The angle and straight spindles at the output end of the flexible shaft are full ball bearing, mounted for long life and vibration-free operation.

In addition to grinding and cleaning, these power units can be used with other attachments for wire brushing and sanding preparatory to painting; for drilling in wood, concrete, brick, iron or steel; for concrete vibrating and surfacing; and for sawing, pumping and sanding.

Heavy-Duty 20-Ton Emergency Jack

TEMPLETON, Kenly & Company, Chicago, has developed a heavy-duty emergency jack, which has a full 20-ton lifting and holding capacity on either the cap or toe lift, designated as the Simplex No. 2030. The new jack weighs 167 lbs., with complete equipment, is 30 in. high and has a lift of 17¾ in. Similar to other jacks manufactured by this company, the No. 2030 tilts on its base when the base pawl is disengaged, permitting angular jacking or pushing and pulling. Lifts may be made on the cap, the auxiliary shoe, or the toe or at any intermediate point by using a chain, provided with the jack, which is fitted with a grab hook, as a sling.



The Simplex No. 2030 Has a Capacity of 20-Tons, and Is Provided With a Tilting Feature Which Permits Angular Jacking

Stanley Safety Saws and Dado-Dapper

THE Stanley Electric Tool Division of the Stanley Works, New Britain, Conn., has improved its CC12 and CC16 heavy-duty portable electric saws and has developed a new attachment for them, the Dado-Dapper, which can be used for cutting grooves or mortising cross arms, bridge stringers, railroad ties, etc.

The CC12 saw has a blade 12 in. in diameter and the CC16 has a blade 16 in. in diameter. They have cutting capacities of 4 in. and 6 in. respectively. On both saws, the guard over the blade was formerly released by a trigger or trip located in the base of the guard. A push rod is now located along the side of the handle, so the operator need only push the lever to operate the guard.

This change is said to be particularly convenient when the saws are used for cutting round stock. Both the trigger release and the push bar can operate independently. The saw blade guard is a safety precaution and the blade is uncovered only as it advances. When the saw is withdrawn from the work, the guard returns instantly to the fully covered position.

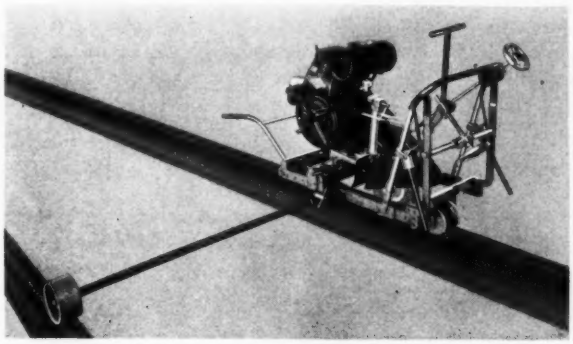
The Dado-Dapper is attached to the frame of the CC12 or CC16 after the saw blade is removed. The standard 7 in. dado cuts 1½ in. wide and 1½ in. deep. Any width of cut may be made by making successive cuts. It is said to do accurate work many times faster than by hand.

Grinder for Longitudinal Rail Head Slotting

THE Railway Track-Work Company, Philadelphia, Pa., has developed equipment for its Model P-16 portable stock rail grinder, which adapts this unit for longitudinal rail head slotting, the purpose of which is the insertion of copper strips in the rail head to prevent the improper functioning of signal circuits at infrequently-used turnouts because of the presence of rust on the rails. A Diamond Brand 10-in. by 5/32-in. by 1-in. grinding wheel is used for the slot grinding.

The New Mall One-Hp. Track Grinder

The P-16, when equipped as a stock rail grinder, has a double cup grinding wheel 10 in. in diameter. A V-belt drive transmits the power from a 4-hp. air-cooled gasoline engine. The unit, which weighs 355 lb. complete, is mounted on a steel frame with two double-flanged wheels at each end and a flangeless aluminum wheel at the end of a guide arm extending to the other rail. All three wheels are insulated. Convenient lift handles are provided at each end of the machine for its removal from the track.



The P-16 Equipped for Longitudinal Rail Head Slotting

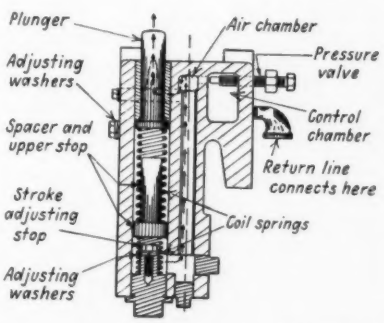
The grinding head is mounted on a swivel block which is pivoted to a cross member of the main frame. Adjustments provide for following the alinement of the switch point or stock rail, for obtaining lateral adjustment and feed of the grinding wheel, and for tilting the machine to obtain the degree of angle desired. A governor adjustment is provided on the engine which regulates the speed of the grinding wheel.

It is said that, by means of lateral adjustment and the use of a double cup grinding wheel, the entire grinding job on both a stock rail and a switch point can be completed by the P-16 without turning the machine around, that it is constructed of quality wear-resisting materials throughout, and that it is light and portable and easily removed from the track.

Improved M. & S. Track Lubricator

AFTER several years of tests under actual service conditions, Moore & Steele, Owego, N.Y., have now placed on the market their Series 1-B pneumatic rail and flange lubricator which incorporates two new features as compared with earlier lubricators manufactured by this company. These improvements, which include a pneumatic control and a constant stroke feature, are said to give a high degree of control over the amount of oil ejected and thereby to reduce wastage and to minimize the amount of oil that is deposited on top of the rail.

The Series 1-B lubricator consists essentially of a plunger box that is held in the rail fishing space by a spring clamp, and an oil supply tank that is lag-screwed to the ends of the ties or to blocks placed at the ends of the ties, with the oil delivered to the plunger box through a short hose. The ejection of oil is actuated by the percussion principle, the discharge taking place through an orifice back of the plunger. It is said that the ejection of oil follows almost instantaneously the striking of the plunger by the wheel flange, and that the oil is applied to the wheel at the junction of the flange and the tread.



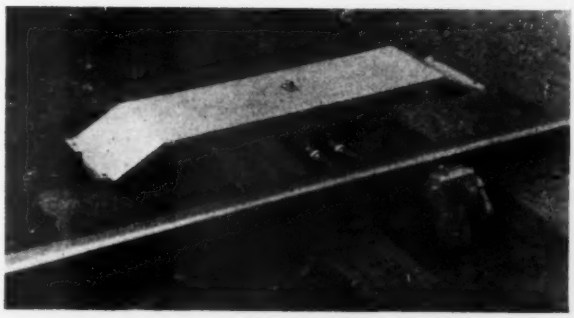
Cutaway Section of the Improved Lubricator Showing the Operating Parts

The operating mechanism incorporated in the plunger box embodies the new constant stroke feature. This mechanism consists of a heavy upper coil spring and a smaller bottom coil spring separated by a combination steel spacer and stop. Projecting upward inside the bottom spring is the stroke-adjusting stop. As the plunger is pressed down by each passing wheel flange, the bottom spring absorbs the downward plunger stroke until the steel spacer meets the stroke-adjusting stop, whereupon the heavy upper spring and upper stop absorb any further downward movement of the plunger. The two springs then return the plunger to its original position.

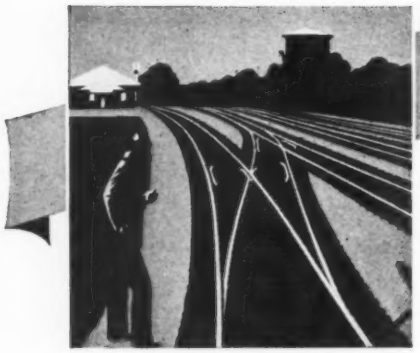
By raising or lowering the stroke-adjusting stop by means of washers that are provided, the downward stroke of the steel spacer is decreased or increased as desired. Once the stop is adjusted, the movement of the steel spacer remains constant for every stroke, regardless of the depth of the wheel flange. This feature is said to give a constant oil feed under all operating conditions, as the movement of the spacer controls the amount of oil forced out of a well located under the spacer.

A feed duct extending upward from the oil well in the plunger box carries the oil to the discharge orifice. However, on its way to the orifice the oil is subjected to pneumatic control, consisting of an air chamber, a control chamber and a pressure valve which controls the size of the opening between the two chambers. The amount of oil and the height of the stream ejected at each stroke are governed by the pressure in the chamber, which can be controled at will by the proper adjustment of the pressure valve.

Thus, by means of the constant stroke and the pneumatic control it is claimed that the volume and force of the oil stream ejected from the lubricator can be adjusted within a wide range to adapt the lubricator to local conditions. This lubricator can be furnished with one, two or three plunger boxes, depending on the length of carry that is desired and other local conditions.



A Service Installation of One of the Series 1-B Rail and Flange Lubricators



WHAT'S the Answer?

Starting Motor Cars

What practices in the starting and operation of motor cars are unsafe? What methods of correction should be followed?

Many Unsafe Practices

By Armstrong Chinn
Chief Engineer, Alton, Chicago

There are many unsafe practices in the starting and operation of motor cars, but without question, the worst of these is to allow a careless man to be in charge. To list all of the practices that are unsafe would require too much space for this type of discussion. The more common ones, however, are as follows:

1. Failure to inspect the car before each day's work, to know that it is in safe running condition. This applies particularly to the brakes, wheels and wheel alinement.

2. Failure to have a proper method of setting the car on and off the track, in which each man has his particular place and a particular duty to perform.

3. Failure to see that tools are loaded properly. Among other things, jacks should be loaded on the rear of the car and bars should be placed well down in the tool trays, so that they cannot work over the ends of the car. I know of two section foremen who lost their lives because they failed to observe these precautions.

4. Failure to start the car properly, such as allowing men to push it from the sides instead of the rear, attempting to crank it by pulling the fly wheel instead of using the crank, or failing to retard the spark before cranking.

5. Failure to load men properly. Every man should have his place, and should be in it when the car is running.

6. Failure to obtain a line-up of train movements, or failure to observe the line-up after it is received. This type of failure has cost the lives of many men.

7. Failure to keep a constant lookout both to the front and to the rear when the car is running. Two men should be assigned to this important duty.

8. Failure to approach street and road crossings at grade under control, so that, if necessary, the car can be stopped short of the crossing to avoid collision with highway vehicles.

The supervisor or roadmaster in charge of men operating motor cars should see that his men understand thoroughly the rules covering the safe starting and operation of their cars, and should see that these rules are reviewed or discussed at suitable intervals so that his men will not forget or overlook them.

Free Running Engine Best

By Earl H. Mills
General Gas Engine Inspector, New York Central, New York

Manual starting of any automotive equipment is attended by the possibility of personal injury. The extent of the hazard is subject to the factors of wrong design, poor condition, improper adjustment, lack of instruction, bad weather, carelessness, clumsiness and many similar and related items. Operation has even more hazards, to which is added the fact that close and intelligent co-operation between several groups is necessary to insure a reasonable degree of safety.

The starting crank is the source of most of the injuries that occur with cars having free-running engines.

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in May

1. *What are the relative advantages and disadvantages of extra gangs and regular or enlarged section gangs for routine maintenance, such as surfacing, renewing ties, tightening bolts, etc.?*

2. *What are the relative advantages of wood, wood and stucco, hollow tile and stucco, brick and concrete for small combination stations?*

3. *When laying rail on tangents, at what points should the first rail be gaged? The second or opposite rail? On curves? Why?*

4. *To what extent can power-operated tools be used to advantage in making light repairs to bridges? To buildings? What tools?*

5. *Does the group or the spot method of renewal induce longer service life in ties? Why? How much?*

6. *When reconstructing a steam-operated water station, what considerations should govern the selection of power to be used in the new facility?*

7. *What is a practical gradient for side ditches in cuts? What determines this? How deep should they be?*

8. *Is there any advantage in the use of maple lumber for trucking on outside platforms, or is some other timber better adapted for this purpose? Should it be treated or used untreated? Why?*

The only sure way to eliminate this hazard is to equip the cars with self-starters. Cranks should be of the non-detachable type. If this is not possible, the detachable crank should have an outboard bearing. In either case, the crank should be so connected that when the piston is ready for its power stroke to pass dead center, the crank will be in the position where the most effective pull can be delivered. To some extent this position is a matter of personal opinion, most designers preferring a position slightly above the horizontal. With the ignition off, it should be possible to rock the motor on compression at this point on each cylinder. Pulling up on the crank through one-half turn, with fingers and thumb on the same side of the handle is generally regarded as being the safest method. It is assumed that the correct preliminary adjustments of retarded spark, clutch out, transmission in neutral, etc., have been made before attempting to start the engine.

Some types of cars with free engines have been provided with detachable starting wheels, which must be pulled by the rim. While this provides safety against a kickback, its use is difficult. The wheel cannot be stowed readily and there are other objections which restrict its use. Where it is possible to grasp the rim of the flywheel, this method involves less hazard from kicking back than the use of a crank.

Direct-connected motor cars should always be pushed from the rear in starting, and should be away from turnouts, or from places where the cribs are not well filled with ballast. One man should be at the controls, in case those doing the pushing are unable to get aboard when the car starts. This type of car may be furnished with low-hung detachable steps in the rear to facilitate getting aboard. Pushing and climbing on from the side is an awkward and a dangerous practice which should not be permitted.

On some large railways, after a number of cranking accidents, those in charge of safety have recommended that all cars be pushed to start them. Then, after having a number of personal injuries, mainly from stumbling or having feet run over, or having cars get away, they have gone to the other extreme and have recommended that the use of direct-connected engines be abandoned and that only free-running-engine cars be employed. It is the considered opinion of most work equipment men that the free-engine car is the best from an all-around safety standpoint.

Most unsafe motor-car operating practices are covered by safety rules and direct orders. Where active supervision and discipline are maintained there are few accidents. Of necessity, many of the rules leave much to the judgment of the man in direct charge of the motor car, for which reason it is extremely important that care be exercised in the selection of motor-car operators, to insure getting only those who can be depended on to do the correct thing under every circumstance. Supervising officers must recognize this responsibility and be ready to assume some of the blame if those they select fail to make safe operators.

Many unsafe operating practices persist, generally involving poor judgment. Some of the most common are:

Failure to stop or get the car under complete control at highway crossings, at the points when men are at work, through station areas, when passing through mechanically-operated switches and crossovers, and at other places where the track ahead may be expected to be obstructed or otherwise unsafe for a rapidly moving car.

Running too fast to stop within the range of vision, through fog, steam, smoke, rain and snow.

Running too fast and too close to a preceding car.

Failure to inspect for mechanical defects, leaving the car on the track without protection, failure to watch to the rear and the stowing of tools carelessly.

Failure to have an understanding with all those on board as to what they shall do in an emergency.

Scuffling or horseplay among those aboard, overcrowding and many other thoughtless or careless acts, which are inherently hazardous.

These practices singly or in combination may represent negligible or major hazards, depending on the immediate judgment of the man in charge. It is for this reason that his selection, his training and the supervision that is given him, contain the answer to the problem of correcting unsafe practices.

What Stock of Pump Repair Parts?

How large a stock of pump repair parts should be carried on a division or a repairman's district? Why?

Does Not Favor

By K. J. Weir

Special Water Inspector, Chicago, Milwaukee, St. Paul & Pacific, Chicago

In most cases modern pumping equipment is designed to do one specific job and to do that job better than any other type of pump. As a consequence, it is reasonable to expect that there will be a large variety of pumps on a territory on which there are variable pumping requirements, if efficiencies are to be maintained at or near the maximum. To carry a stock of repair parts sufficient for a large group of such pumps is, therefore, likely to involve a large initial investment, with subsequent overhead and stores expense costs which are not deemed necessary.

Most pump manufacturers stock repair parts at one or more points to make them readily available on short notice. Barring extreme emergencies, most pump troubles can be foreseen because they can be detected at the regular inspections. Repair parts can then be ordered in advance of actual need, the replacement being made before a major breakdown occurs. This practice requires careful policing by the supervising officers, however, to insure that the inspections are made regularly and that they are thorough.

Few roads are so fortunate as to be able to install duplicate pumping equipment at all their stations, one set of which can always be held for emergency use while the other unit is undergoing repairs. Portable gas-driven pumping equipment has proved its value for emergency service where low suction heads prevail, since it can be operated while repairs are being made to the regular pumping units. By holding the portable units at strategic points, they can be made easily available to a large territory quickly, since they can be shipped by baggage, by truck or, sometimes, by automobile.

Varies with Pump

By J. P. Hanley

Water Service Inspector, Illinois Central, Chicago

The size of the repair stock for either a division or a district will vary with the predominant type of pump in use, the promptness with which repair parts can be obtained from the manufacturer, the importance of the water station and often on other local

conditions. If the predominant pump is of the reciprocating or piston type, a stock of springs and studs should be kept on hand, sufficient to cover all probable needs for the replacement of these parts for 60 to 90 days. Requisitions for other parts should ordinarily be deferred until the existing parts begin to show decided wear. Link and toggle bolts, bushings and other small moving parts can usually be made in the local shop, and this should be checked closely before ordering from the manufacturer.

Centrifugal pumps seldom require a reserve stock of repair parts. The wearing rings on the impeller and casing and the wearing sleeves on the pump shaft usually take most of the wear. Pumps of this type are generally fitted with grease-lubricated ball bearings which last for years with little maintenance. The packing for the shaft should be selected carefully and applied with a lantern spacer ring, spaced correctly to insure both water seal and lubrication. A supply of shaft packing sufficient for 60 day's requirements is about all the stock that need be carried for this type of pump. Requisitions for wearing rings and wearing sleeves should be deferred until the regular inspections show decided wear. These parts do not fail suddenly and can be secured from the manufacturers in regular routine in 30 to 40 days.

The same principle of careful inspection should prevail before ordering reserve parts for hot-water and vacuum pumps. Consideration should be given to transferring parts from similar pumps in other service and the possibility of making toggles, bolts, bushings and other moving parts in the local shops instead of ordering them from the manufacturer.

Care should be used in selecting suitable types of hot-water valves and packings for these pumps, for cold or medium hot-water valves fail quickly when used in pumps handling water at the higher temperatures. Valves, springs and packing will require more frequent renewal than those in cold-water pumps, and the reserve stock of these parts should be estimated carefully by the division foreman from his experience on the division. The ideal condition is to have sufficient active stock of needed parts with the minimum inventory expense.

Division Meetings for Foremen

What merit is there in division meetings of foremen for the general discussion of their work? How often should they be held? Who else should be present? Why?

Will Pay for Themselves

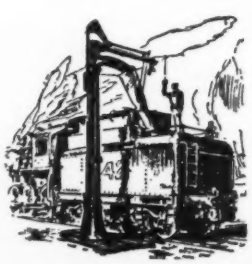
By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

Periodical meetings of foremen give them a clearer understanding of the conditions to be met by them and by the railway. An assembly of 10 to 20 foremen from contiguous territory makes the most satisfactory meeting. Larger groups are somewhat difficult and expensive to get together, while causing the most distant foremen inconvenience and long hours of travel. These meetings should be programmed for briefness and no one subject should be allowed to take more than 10 or 15 minutes.

The roadmaster or supervisor should preside and representatives of the transportation, accounting, stores and safety departments should be at the meeting if this can be arranged. It may be well also to have a motor mechanic there to advise as to the condition of motor cars coming in for repairs and the reasons for failures.

With a set-up of this kind, the foremen find out what part of the game they play for others and what parts the others play for them. Generally, foremen care little for letter writing and such meetings will clear up many points that could be only partly clarified by much letter writing. Experience has shown that a vigorous and enthusiastic meeting in the spring and another in the fall will pay for themselves by the understanding and interest that will be engendered in the foremen.

A word of caution may be pertinent at this point. The foremen are responsible to and receive their instructions from the roadmaster or track supervisor, and nothing should be said or done at any meeting that might in any way or degree tend to disrupt or detract from this relationship between them.



No Doubt About It

By T. F. Scholes
Assistant Supervisor of Track, Pennsylvania, Derry, Pa.

Important advantages of foremen's meetings include the fact that new policies, new instructions, new practices and other new items can be gotten across to the foremen more effectively and in less time than by the regular procedure for such matters. These meetings can also be used to drive home matters relating to safety and to improve safety records. They enable the foremen to keep abreast of current improvements in maintenance practices, and by contact with other foremen they broaden the knowledge and outlook of those who participate.

Once a month should be often enough to hold such meetings. The intervals should be great enough to prevent their becoming a matter of routine, thus losing their effectiveness.

It is desirable that officers in the maintenance department above the division engineer and the division superintendent be present occasionally, for it is a source of pride to the men to be able to say that they have been associated with their superior officers. It also enables these officers to become acquainted with their local leaders and their qualifications.

Have Many Advantages

By J. P. Mumford
Track Supervisor, Cincinnati, New Orleans & Texas Pacific, Oakdale, Tenn.

Joint meetings of foremen to discuss their problems have many advantages and, so far as this is practicable, should be held every few months. They give the foremen an opportunity of hearing at first hand the problems facing others and their methods of correction. They also give the supervisors an opportunity to discuss with the men collectively, new railway policies and points of safety, and to review pertinent rules of both the roadway and operating departments. To my knowledge, there are foremen whose railway contacts have been limited for some years to the adjoining foremen, their supervisors and an occasional visit from the roadmaster.

These meetings should be conducted by the supervisor, or possibly,

by one of the foremen, and in such a manner as to require that every one in attendance take part. The superintendent, the trainmaster, the division engineer, the safety supervisor and the roadmaster should attend occasionally, but not too often, for the average foreman will not express himself so freely in their presence, and the meeting should be kept strictly on a roadway basis if it is to be successful. The average safety meeting, when attended by all departments, is too often dominated by the operating and mechanical departments, and the roadway men do not feel justified in bringing their problems to the front because, for some reason, they always seem to shrink to minor importance in the presence of these groups.

These meetings should be held at a central point and relief foremen or responsible laborers should be left in charge of the sections while the foremen are away. A foreman benefits from riding over other sections when going to or returning from the meeting for this allows him to compare other sections with his own; this in itself is enough to justify the meeting. A regular schedule for the meetings is not practical, because of varying weather and local conditions, but the roadmaster and division engineer should encourage their supervisors to sponsor meetings of foremen and aid them in preparing a program.

Scouring at Culverts

What effective means can be employed to prevent scouring at the discharge end of a culvert? What considerations affect this?

Generally too Small

By S. F. Grear
Assistant Engineer of Bridges, Illinois Central, Chicago

Scouring at the downstream end of a culvert generally indicates that the opening is too small. By this I mean that the water becomes backed up so that it goes through the culvert under a head, creating a high velocity at the outlet and, consequently scour. Scour deepens the channel immediately at the outlet, thus forming a pond which may be only a foot or two in depth or as much as ten feet. The pond may widen to two or three times the width of the culvert and may be from a few feet to 60 or 70 ft. long, depending on the amount of water in the stream and the type of soil in the streambed. In some cases there is a tendency to undermine the outlet, and in this event the opening should be enlarged to carry the flow without high velocity. If this cannot be done within reasonable cost, steps must be taken to protect the streambed below the culvert.

The most effective method is to build flaring wing walls, with a concrete paved invert between them, with a curtain wall to prevent cutting back under it. This will permit the water to spread out over a wide area before flowing into the ground. In one extreme case, a pool 7 ft. deep by 150 ft. long was created. Piles were driven about 100 ft. below the outlet of the arch to retain heavy stone riprap. The pond between the piles and the arch was filled with heavy stone, which was covered with a concrete pavement, providing an effective remedy.

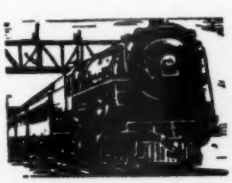
In soils that erode easily or where the gradient is steep, the flow line of the stream on the downstream end may be scoured well below the floor of the culvert. In such cases, it is advisable to construct a stepped spillway to dissipate the energy of the falling water, or to construct a flume to carry the water far enough from the embankment to prevent damage.

Every Case Individual

By H. G. Carter
Division Engineer, Central of Georgia, Columbus, Ga.

Every case of scour requires individual study of the factors involved, consideration being given to the gradient of the culvert; the head of water to be expected, for velocity is an important factor; the gradient below the culvert, that is, whether there is a sharp drop, a steep or a gentle slope; the nature of the soil, whether it is clay, loam, sand, shale or rock, and the slope of repose.

Effective means of preventing scour will depend primarily on the foregoing factors. If the culvert is on a light grade and the slope below the outlet is gentle, an apron will suffice ordinarily. If there is a sharp drop from the outlet, a well will be needed to break the flow. If the drop is not abrupt enough to warrant a well, a sluice can be constructed and, if the grade is sharp it will be advisable to construct a basin at the bottom, with the top of the dam at the ground level to break the flow and agitate the water before it reaches the natural soil. When a steep slope is encountered that is too long to justify a sluice, a series of check dams can be constructed to step the water down to a more gentle slope, but where this is done, the dams must be so placed that the top of each successive dam is above the bottom of the one next up grade, to prevent undermining. Another important factor is that a spillway be provided in each dam, of ample size to care for the volume of water delivered, to insure against side wash. It is also advisable to provide a splash apron below each dam. These check dams can be constructed of second-hand timber and, in locations where vegetation grows readily, may not need to be replaced in some cases, for the vegetation will grow enough to protect the ditch which has been stabilized by the dams.



Riprap May Be Enough

By H. M. Tremaine
District Engineer, Northern Pacific, Spokane, Wash.

If the ground is of a nature that requires grillage because of its instability, perhaps it may be necessary to drive sheet piles across the stream bed at the face of the culvert to prevent undercutting, and then place riprap, either laid carefully or flushed with cement mortar, in the channel for a requisite distance below the outlet. If, however, the culvert is on stable ground, with no unusual conditions, and the volume of water is not excessive, ordinary loose riprap should give adequate protection.

If the culvert is on a hillside or in a fill well above the original ground, it may be desirable to conduct the water to a lower elevation by means of a flume of timber, lined or so framed as to prevent leakage, or of metal culvert pipe, either full section or half round. If flumes are on unstable ground, those of timber usually present the better chance of overcoming possible settlement through current maintenance, although there is an attendant fire hazard. Also if the timber is unseasoned it will eventu-

ally be necessary to take care of shrinkage. These timber flumes may be constructed with either flat or V-shaped bottoms. The V-shaped section has the advantage of being self-cleaning although it is usually more expensive to build. The lining may be of tin recovered from car-repair work and must be lapped, for it is most important that the flumes do not leak.

Painting Galvanized Sheets

How can galvanized roofing or siding that is beginning to show rust spots be painted?

Clean Thoroughly

By E. C. Neville
Bridge and Building Master, Canadian National, Toronto, Ont.

When it becomes necessary to paint galvanized roofing or siding that is beginning to show rust spots, the first care should be to clean the surface thoroughly before any paint is applied. If the rust appears only in spots, it is usually sufficient to clean these spots with a wire brush, making sure that all signs of rust have been removed. Immediately thereafter, a coat of red lead in linseed oil should be applied over the cleaned areas. This should be allowed to dry thoroughly, after which the whole surface should be given a priming coat of red lead, and this should be followed by the body and finishing coats.

If the whole surface has become rusted, it should be gone over with wire brushes; better still, it should be cleaned with the sand blast, but in any case, care should be taken to insure the removal of all rust. New galvanized iron is seldom painted, but if this is to be done the surface should be washed with an alkali to remove the acids used in the galvanizing process. The best practice is to leave the metal exposed to the weather for several months until all traces of acid have been removed naturally, after which the paint will adhere.

Use Red Lead

By Supervisor of Bridges and Buildings

Ordinarily, galvanized roofing and siding do not need painting. In fact, it is practically impossible to get paint to adhere to newly galvanized surfaces because the coating left by the galvanizing process tends to repel the paint. If an attempt is made to paint such surfaces, the chances are 100 to 1 that the paint will begin to peel almost as soon as it has dried. It is possible to paint such surfaces with satisfactory results, although this is not necessary for protection purposes for the zinc film is put on the sheet primarily to protect it from corrosion. It is only when this film is broken from wear, flexure of the sheet or other form of damage, that there is any value in the use of paint as a measure of protection.

If it is desired to paint freshly galvanized surfaces, they can be prepared by washing them with a strong alkali or, if there is no need to hurry, they can be allowed to weather from six months to a year. If this is done, the paint may be expected to adhere the same as on any other clean metal surface.

If the zinc film has been broken through use or age and rust spots are beginning to show, paint should be applied. If the sheets are relatively new they must be cleaned with alkali, as described. If they are old, it is probable that the greasy coating has long since disappeared under the action of the weather. In either event, the rust spots should be cleaned thoroughly with a stiff brush, wire preferred, to remove all rust, soot and other dirt. Then, as quickly as possible, the cleaned surface should be given a priming coat of red lead in linseed oil. As soon as the paint on the touched-up spots has dried, the entire surface should be primed with the same paint, brushing it thoroughly to insure that every irregularity in the surface is covered with an unbroken film.

This coat should be allowed to dry hard before more paint is applied. The usual body and finishing coats can then be applied the same as on any other surface. Some experienced painters recommend that all coats on painted galvanized sheets be lead paints, that is, red lead for the priming coat and either red or white lead, without other pigments, for the remaining coats.

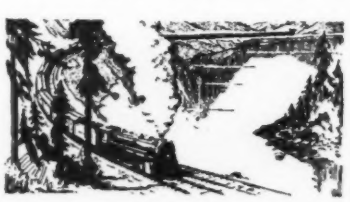
Cleaning Brick Buildings

What effective and economical methods can be employed to clean brick buildings? How should the force be organized?

Three Methods Used

By A. L. Sparks
Architect, Missouri-Kansas-Texas, St. Louis, Mo.

Three methods are in general use for cleaning brick buildings, namely, washing by hand, vapor spray and sand blasting. Washing by hand, using dilute muriatic acid, with stiff bristle brushes and scrapers is the most common method. It is employed for cleaning the surfaces of new buildings, and is effective on glazed or enameled brick and terra cotta. It is the least expensive method, the fastest, and requires the least equipment. The necessary equipment includes ladders, staging, steel hooks, pulley blocks, ropes, buckets and brushes, the latter including both steel and fibre. This equipment will also be necessary with either of the other methods. The washing solution should not be made any stronger than necessary to remove the soiled film. It will vary for different kinds and conditions of texture. If it is too strong, it will eat mortar from the joints and may discolor white cut stone sills and trim.



Vapor-spray cleaning is employed on more elaborate surfaces where a thorough cleaning is desired, and especially where there is considerable deeply cut ornamental work or where the general texture is rough. Both this method and washing may be objectionable on buildings that have soft limestone faces, by reason of discoloration from absorbed dirty water. The process consists of brush-coating the surface with a solution of water and soap or cleaning chemical, and then spraying with a mixture of steam and water carried in two separate hose lines from the machine on the ground to the spraying nozzles, where it is mixed and atomized.

In this case the cleaning equipment, which is usually mounted on a small truck, consists of a water tank, an oil-burning boiler or heater, an oil tank and a small pump. A low steam pressure is carried, varying with the length of the hose and the heat desired at the nozzle. In addition, all of the equipment mentioned under the first method will be required. Substantial canopies with waterproof coverings and tarpaulins are also necessary to protect the public.

Sand blasting is often used for cleaning buildings having limestone or concrete surfaces and brick surfaces that have been painted. When done by experienced men, this process produces results that cannot be obtained by either of the other processes. It also has disadvantages, the principal one being the effect of the rapid abrasion on adjoining wood, sheet metal, glass and other materials which the sand may strike. It also cuts into mortar joints, necessitating much repointing. The blast wears away a thin layer of the wall surface, erases most of the blemishes and leaves the original color of the material exposed. An advantage is that it also cleans rust from exposed iron and steel and with proper skill it can also be used to remove paint from wood surfaces.

Each of the foregoing methods is effective, if properly selected for the surface to be treated. It is doubtful whether it will be economical to maintain an organization for cleaning railway buildings by the second or third methods unless the regular maintenance program includes the systematic cleaning of a large number of buildings. In this event, it might be that regular painting gangs could be enlarged and organized for the work, especially by using men accustomed to spray painting. More likely, however, it will be cheaper to contract such work. The first method can be employed by any regular paint gang at practically no extra expense for equipment or supervision and no change in organization.

Prefers Washing

By Supervisor of Buildings

There are only a relatively few railway buildings that can be cleaned with economy, for they will become dirty again almost immediately. I refer particularly to enginehouses, shops, power plants and other buildings around engine terminals and switching yards. This leaves stations and offices for principal consideration.

Obviously, the best job of cleaning can be done by sand blasting, but it is somewhat expensive, requires special equipment and certainly musses the premises while the job is under way. For important buildings I recommend this method of cleaning. If the road possesses the sand blast equipment, the work can be done by the same forces that are employed for cleaning structural steel but should be closely supervised; otherwise a contractor should be employed.

For less important buildings or those on which it is not necessary to clean all surfaces, I would scrub and wash the brick with dilute hydrochloric acid and stiff fibre brushes, using a regular paint gang for the work. I have seen some industrial and commercial buildings cleaned with steam, after the surface has been swabbed with a strong alkali, but I do not recommend it, for it is expensive, requires special equipment and training, and may leave stains on the trim and even on the brick.

Removing Shims in Spring

What precautions are necessary when removing shims as the frost leaves the ground in the spring?

Remove the Cause

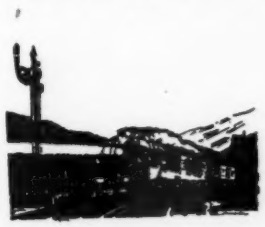
By J. B. Martin
General Inspector of Track, New York Central, Cleveland, Ohio

Obviously, the best action that can be taken in the event of heaving track is to remove the cause either by means of additional ballast or improved drainage, so that it will not be necessary to remove shims. However, if this has not been done and the track heaves, the shims should be inspected daily and necessary adjustments made, when the frost begins to come out. Both gage and level should be used when this is being done, so that the shimmed spots will be kept in good surface. Substantial shims should be used and they should be fastened so that they will not work out from under the rail.

Start with First Thaw

By Robert White
Section Foreman, Grand Trunk Western, Saranac, Mich.

One should not wait until the frost leaves the ground to give attention to shims. Adjustments will be necessary almost as soon as the first thawing is in evidence, that is, as soon as it goes below the surface. From this time until the track has settled, the shims that were put in as the track heaved, must be removed and thinner shims substituted. It may be necessary to do this several times at each point when heaving has occurred and, sometimes it may be necessary to put in thicker shims or even place them where no shims had been used previously.



Frost goes out unevenly and no one can predict in advance exactly what will happen as it leaves the roadbed. For this reason, detailed instructions can never be applied to a given territory or to a specific point on that territory, but the procedure must be left to the judgment of the foreman on the ground who is able to keep in touch with the track daily.

Settles Unevenly

By W. Woolsey
Section Foreman, Illinois Central, Chicago

Heaved track settles relatively more rapidly than track that has not heaved, as frost leaves the ground permanently in the spring. As a consequence, spots that have been shimmed will be high unless the shims are removed or adjusted as settlement occurs. All shimmed track should be watched carefully at this time, especially where the shims are thickest, and thinner shims should be substituted as necessary and this should be repeated as required.

When removing extremely thick shims, that is, when they extend under both rails, unusual care must be exercised for in this case it will be necessary to disturb both rails. This work should be done only under full flag protection, as with any other adjustments that require many spikes to be removed at one time. In the latter event, the buckling of the rails

must be guarded against, for track will buckle during the first warm days of spring almost as readily as in hot weather.

Maintain Smooth Surface

By L. J. Gilmore
Division Roadmaster, Great Northern, Superior, Wis.

As the frost is leaving the roadbed in the spring, it becomes necessary either to remove the shims that have been placed as the track heaved, or to reduce their size. In doing this it is important to maintain smooth surface. If the track was in good surface and line when the ground froze, it will return to the same uniform surface and alinement after the frost has left the roadbed and the material in the subgrade has settled back to normal.

If the shims are reduced in thickness by reshimming with thinner shims as the frost is leaving the roadbed, and the roadbed is settling, we can expect the track to return to its original surface when the frost is entirely gone. The only precaution necessary is to maintain a smooth surface as the frost recedes, by reshimming these spots with thinner shims, not by trying to level the track by spot surfacing until it is certain that it has fully settled.

Frost seldom leaves the ground twice in the same manner. If it is fairly dry when the temperature rises in the spring, the frost will go out more slowly than if the warm weather is accompanied by rain. In some places the frost will go out on one side of the track sooner than on the opposite side.

These conditions should be given careful study at the spots when the heaving is experienced, and proper surface should be maintained by reshimming instead of disturbing the ballast by tamping. If tamping is resorted to, it will be necessary to dig down the humps later to restore the surface at those places where the track was raised before the frost was entirely out of the roadbed.

Bearing Power of Piles

What practical rule can be followed for determining the bearing power of piles?

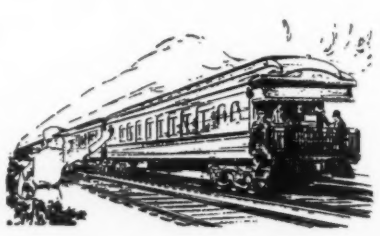
No Formulated Rule

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

For the purpose of this discussion, piles for trestles, for pier and abutment foundations and for buildings can be divided into two groups: (a) those that are driven to a solid support, such as rock, hardpan, firm clay or hand graved and thus, to some extent at least, act as columns; and (b) those that have no end support. The safe load on piles in the first group will depend in large measure on the resistance to lateral movement afforded by the strata through which they pass. In firm, stiff ground, it may be possible to load the piles approximately to the crushing resistance of the least cross section, that is, the point. It is not good judgment to do this, however, for if one pile fails through some defect or from other causes, additional load will be thrown on the remainder of the piles in the bent or foundation and they may all fail together or progressively. If the ground is less firm, the load will need to be reduced accordingly, although some lateral support may sometimes be given by tieing the piles together.

Piles in the second group depend almost entirely on skin friction for their load-bearing value, and this is usually determined by the average penetration of the pile under the last few blows, using a steam hammer weighing 6,300 lb., having a striking ram of 3,000 lb., with a 3-ft. drop and 68 to 70 blows a minute.

Despite the effort to make mathematical determinations, there can be no formulated rule that will apply to all cases, because there are too many conditions that intervene to modify the amount of penetration. Because of the varying conditions of driving and soil, it is our practice to drive test piles on long bridges to determine the length required, and in many cases we find it necessary to obtain as much as 40 to 45 ft. of penetration to insure satisfactory bearing power.



In not a few cases we find 25 to 30 ft. of soft, plastic clay underlaid with 15 to 18 ft. of tough, compact clay. Under the last 200 to 300 blows of the hammer the pile may penetrate only 4 to 5 in. At this rate it requires continuous driving for 18 to 25 min. to get a pile down. With the skin friction engendered by the tightening of the soil during the last 6 to 8 ft. of penetration, we consider that the bearing power will be satisfactory. Where the soil is hard and firm for a depth of 20 to 25 ft. from the surface, it usually requires from 20 to 25 min. to drive each pile, and many of them are driven to refusal at this depth.

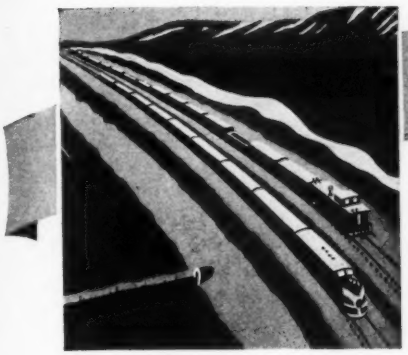
It is still more difficult to develop a practical rule for the bearing power of piles driven through firm gravel or packed sand to a solid bearing on rock or hardpan, where the penetration is not more than 15 or 20 ft. In such cases we sharpen the end to a square point and protect it with steel bands or a pile shoe and drive it to refusal. It is important, however, to guard against driving any pile too hard as it may broom or break below the surface.

Test is Safest Method

By General Inspector of Bridges

I know of no practical or other rule that can be followed universally to determine the bearing value of piles under all conditions of soil and driving. I have driven piles by formula and according to my best judgment, and I have had both success and failure with each method. Obviously, if one does much pile driving in a particular locality, as in the construction of trestles on a given section of a line, he learns much about the peculiarities of the soil and what can be expected from the piles. Yet this is not always a safe guide, as almost any bridgeman can testify.

When renewing piles in a trestle, it is generally safe to assume that the penetration that was satisfactory for the old piles will be as satisfactory for those that replace them. If the length of the piles and the depth of penetration are not known, or if the structure is a new one, test piles should be driven. In many cases, especially for trestles, the use of a formula based on the penetration under the last few blows will be satisfactory. If the piles are for a foundation, I prefer to give them a test loading, for the information thus obtained is definite and positive and can be relied on to give a safe figure for the working load that the piles can bear.



NEWS of the Month

C. G. W. Second Road to Complete Reorganization

At midnight on February 19, the Chicago Great Western became the second major railroad to emerge from trusteeship, when properties of the Chicago Great Western Railroad Company were transferred to the Chicago Great Western Railway Company which was recently incorporated in Illinois. The signing of orders by the federal district court, directing the transfer, marked the end of the road's receivership which began on February 28, 1935, when the road petitioned the court for authority to reorganize under section 77 of the bankruptcy act.

Strike Ballot on Vacations with Pay

On or about February 15, approximately 750,000 railroad employees of 14 non-operating unions received strike ballots on the demand for two weeks vacation with pay for all regular employees and one day for each month worked for other workers. The unions involved include all the railroad unions except the five transportation brotherhoods, which are understood to be planning a separate drive, and the American Train Dispatcher's Association, whose members already have vacations with pay, and the Order of Sleeping Car Conductors.

William Gibbs McAdoo Dies

William Gibbs McAdoo, who was Director-General of railroads during federal war-time control, died in Washington, D. C., on February 1, at the age of 77. In March, 1913, he became Secretary of the Treasury and in 1918 became also director-general of railroads, holding this post until three days after the Armistice was signed, when he was succeeded by Walker D. Hines. Mr. McAdoo remained active in politics and was Senator from California from 1933 to 1939. He had been chairman of the board of the American Presidents Steamship Line since his defeat for re-election to the Senate in 1938.

More Cars and Locomotives Installed in 1940

In 1940, Class 1 railroads placed 65,545 new freight cars and 419 new locomotives in service. This represented an increase of 41,017 new freight cars and 99 locomotives as compared with the number installed in 1939. In addition, on January 1, 1941, 35,702 freight cars and 206 locomotives were on order, as compared to 37,099 freight cars and 117 locomotives on January 1, 1940.

Crossing Accidents Increase

Fatalities resulting from accidents at railroad-highway grade crossings in 1940 totaled 1,814, an increase of 416 compared with 1939 and an increase of 297 compared with 1938. Except in 1937 when there were 1,875, the number of such fatalities was greater in 1940 than in any year since 1930.

Persons injured in highway-grade crossing accidents in 1940 totaled 4,656, an increase of 657 compared with 1939, and an increase of 638 compared with 1938. In 1937, there were 5,136 persons injured in such accidents. The increase in crossing accidents in 1940 is attributed by the Safety Section of the Association of American Railroads largely to the fact that more trains and automobiles were in operation.

1940 Net Operating Income $682,118,487

In 1940, Class 1 railroads of the United States earned a net operating income, before interest and rentals, of $682,118,487. This was an annual rate of return on their property investment of 2.61 per cent. In 1939 corresponding earnings were $588,827,077, or 2.26 per cent and in 1930 they were $868,719,483 or 3.36 per cent on property investment. Gross operating revenues in 1940 totaled $4,296,600,473, compared with $3,995,004,243 in 1939, and $5,280,234,535 in 1930, an increase of 7.5 per cent in 1940 above 1939, but 18.6 per cent below 1930. Operating expenses in 1940 amounted to $3,089,474,191, compared with $2,918,209,705 in 1939, and $3,931,043,991 in 1930, or 5.9 per cent more in 1940 than in 1939, but 21.4 per cent below 1930.

First Diesel Freight Run

A new 5,400-hp. Diesel-electric freight locomotive, recently delivered to the Atchison, Topeka & Santa Fe by the Electro-Motive Corporation, General Motors subsidiary, La Grange, Ill., and placed in regular main-line freight service at Argentine, Kan., on Feb. 5, completed its first run to Los Angeles, Cal., on Feb. 8. The train handled between 2000 and 3000 tons in a number of cars varying from 49 to 68, a distance of 1,782 miles from Argentine to Los Angeles, in 55 hrs. running time. The average speed was 32.5 m.p.h., the maximum speed 65 m.p.h., the maximum drawbar horsepower, 4,400; fuel consumption per mile, 6.05 gallons. Dynamic braking was used at four places during the run, for a total of 83 miles. Where the dynamic retarding brake was used, it was necessary to set the train air brakes only about one-fourth as much as usual. It is said that the Diesel-electric locomotive demonstrated notably reliable performance, ample power to haul the train up heavy grades, and ability by means of the dynamic braking feature to ease the train down heavy grades with substantially less air-brake application and less wheel heating and brake-shoe wear.

Roads Reject High Scrap Bids

In response to a request by the Price Stabilization Division of the National Defense Council, the Pennsylvania, the New York Central and a number of other eastern roads have served notice on scrap dealers that they will reject unduly high bids above the value which the government has said scrap should be sold to steel producers. This is the first time since the first World War that railroads have taken the position that they would reject quotations from responsible scrap dealers because they were "too high." In December the National Defense Council insisted that the price of No. 1 heavy melting steel should not exceed $24.50 per gross ton at Pittsburgh, Pa., and this price was reduced to $22.00 a ton in January and $21.00 a ton in February.

Ralph Budd Receives Washington Award

On February 24 at the Palmer House in Chicago, Ralph Budd, president of the Chicago, Burlington & Quincy and transportation member of the National Defense Advisory Commission, was presented the Washington Award for 1941 "for vision and courageous leadership in advancing the technological frontiers of high-speed railroad transportation." The recipient of the award is selected each year by a commission representing the Western Society of Engineers, the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers and the American Institute of Electrical Engineers. This is the second award Mr. Budd has received in a period of only a few weeks. As reported in the February issue of *Railway Engineering and Maintenance*, he was awarded the John Fritz medal January 15.

Personal Mention

General

Anton Anderson, chief engineer of the Chicago, Indianapolis & Louisville (Monon), has been appointed assistant chief operating officer, with headquarters as before at Chicago.

John H. Rigby, superintendent of the Columbus & Greenville and a maintenance officer by training and experience, has been promoted to general manager, with headquarters as before at Columbus, Miss. Mr. Rigby was born at Anamosa, Iowa, on October 19, 1878, and entered railway service in October, 1900, as a laborer on a bridge gang on the Southern. In 1902 he was promoted to bridge foreman and in 1907 to supervisor of bridges and buildings at Knoxville, Tenn. In 1910 he was appointed assistant roadmaster at Knoxville and in the fall of 1917 he was promoted to roadmaster at Asheville, N. C. In 1918 he was promoted to general agent and in 1920 to superintendent of the Southern Railway in Mississippi (now the Columbus & Greenville), with headquarters at Columbus.

Don M. Rankin, trainmaster on the Atchison, Topeka & Santa Fe, and an engineer by training and experience, has been promoted to superintendent of the New Mexico division, with headquarters

Don M. Rankin

at Las Vegas, N. M. Mr. Rankin was born at Lecompton, Kan., on March 29, 1891, and graduated from the University of Kansas in 1915. He entered railway service on August 15 of the same year as a chainman on the Eastern division of the Santa Fe and was promoted successively to rodman and transitman. He entered the U. S. Army on April 15, 1918, and served in the meteorological section of the signal corps. He returned to the Santa Fe on May 1, 1919, as a transitman and was promoted to assistant engineer in the office of the chief engineer, Eastern lines, at Topeka, Kan., on May 16, 1924. On December 16, 1926, he was appointed office engineer on the Southern Kansas division at Chanute, Kan., and in May, 1928, he was advanced to division engineer at that point. Mr. Rankin was appointed office engineer at Chanute in October, 1931, and in 1937 he was promoted to division engineer at Marceline, Mo. He was transferred to Arkansas City on November 1, 1938, and on July 1, 1939, he was promoted to trainmaster at Wellington, Kan. Mr. Rankin was transferred to El Paso on January 1, 1940, where he remained until his recent promotion, effective February 15.

Engineering

L. G. Mosher, chief clerk to the chief engineer of the New York, Chicago & St. Louis (Nickel Plate) at Cleveland, Ohio, has been promoted to personnel assistant-maintenance of way, a newly created position, with headquarters at Cleveland.

F. R. Micheal, supervisor of bridges and buildings on the Wabash at Montpelier, Ohio, has been promoted to division engineer of the Moberly division, with headquarters at Moberly, Mo., succeeding **S. N. Crowe,** who has been assigned to other duties.

Thomas L. Phillips, principal assistant engineer of the Western Pacific, has been promoted to chief engineer, with headquarters as before at San Francisco, Cal., succeeding **Col. Joseph White Williams,** whose death on February 4 is announced elsewhere in these columns.

H. L. Roblin, roadmaster on the Canadian National at Regina, Sask., has been promoted to division engineer at that point, succeeding **P. C. Perry,** who has been transferred to Port Arthur, Ont. Mr. Perry replaced **E. W. Robinson,** who has been appointed assistant engineer on the Western region, with headquarters at Winnipeg, Man.

J. G. Gilley, supervisor of track of the Shelby district of the Chesapeake & Ohio, with headquarters at Pikeville, Ky., has been promoted to assistant division engineer of the Ashland division, with headquarters at Ashland, Ky., to succeed **F. P. Barrick,** who has been transferred to the Russell division, as announced in the February issue.

Walter A. Blackwell, assistant engineer maintenance of way of the Western Maryland, has been appointed engineer maintenance of way, with headquarters at Baltimore, Md., and the position of assistant engineer maintenance of way has been abolished. A biographical sketch of Mr. Blackwell was published in the September, 1940 issue, page 586, following his promotion to assistant engineer maintenance of way on June 12.

A. E. Stewart, roadmaster on the Canadian Pacific at Cranbrook, B. C., has been promoted to division engineer, with headquarters at Nelson, B. C., succeeding **G. B. Alexander,** who has been transferred to Vancouver, B. C. Mr. Alexander replaces **Thomas Ernest Price,** whose promotion to district engineer of the Manitoba district, with headquarters at Winnipeg, Man., was announced in the February issue.

John L. Minor, assistant engineer of the appropriation bureau in the office of the chief engineer of the Southern Pacific at San Francisco, Cal., retired on January 16, and **H. A. Lathrop,** assistant division engineer on the Coast division at San Francisco, has been appointed to succeed Mr. Minor. **H. S. Kellam,** assistant division engineer of the Western division, has been transferred to the Coast division, relieving Mr. Lathrop.

F. D. Kinnie, district engineer of the Coast lines of the Atchison, Topeka & Santa Fe, with headquarters at Los Angeles, Cal., has been appointed regional engineer, with the same headquarters, a newly created position, assigned to special duties in connection with national defense and industrial projects. **M. B. Clark,** division engineer at San Bernardino, Cal., has been promoted to acting district engineer at Los Angeles, succeeding Mr. Kinnie, and **R. D. Pierson,** division engineer, at Winslow, Ariz., has been transferred to San Bernardino. **E. L. McDonald,** assistant division engineer at Needles, Cal., has been advanced to acting division engineer at Winslow, relieving Mr. Pierson. **R. L. McDaniel,** construction engineer, with headquarters at Los Angeles, Cal., has been promoted to acting division engineer at Needles, replacing Mr. McDonald.

H. S. Talman, assistant division engineer on the Chesapeake & Ohio at Russell, Ky., who has been promoted to division engineer of the Hinton division, with headquarters at Hinton, W. Va., as reported in the February issue, was born on November 7, 1903, at Richmond, Va. He obtained his higher education at Virginia Polytechnic Institute, graduating in 1925. Mr. Talman entered railway service on July 9, 1925, as a tracer and draftsman on the C. & O. In the following year he was promoted to assistant cost engineer, then being advanced to track supervisor in 1932. He was further promoted to assistant division engineer in 1937, which position he held until his recent appointment as division engineer.

Earl G. Wall, assistant division engineer on the Alton, has been promoted to division engineer, with headquarters as before at Bloomington, Ill., succeeding **Ralph H. Washburn,** whose death on January 28 is announced elsewhere in these columns. **Harold William Miner,** instrumentman, has been advanced to assistant division engineer, relieving Mr. Wall. Mr. Miner was born at Bloomington on July 14, 1905, and attended the University of Illinois in 1923, 1924 and 1925. He entered railway service in September, 1925, as a rodman in the engineering department of the Eastern division of the Chicago & Alton (now the Alton) at Bloomington. In 1929 he was promoted to instrumentman and since 1935 he has been engaged primarily on construction work in connection with grade separation projects. In January, 1941, he was transferred to the Western division. His promotion was effective February 1.

C. F. Edwards, whose promotion to assistant division engineer of the Hocking division of the Chesapeake & Ohio, with headquarters at Columbus, Ohio, was announced in the January issue, was born at Coshocton, Ohio, on June 1, 1898,

and graduated from Denison University in 1922. He entered railway service on March 3, 1924, as a rodman on the system engineering corps of the Chesapeake & Ohio. He was later promoted to instrumentman and assistant engineer and on October 1, 1925, he was advanced to assistant cost engineer. On May 15, 1929, he was promoted to cost engineer on the Hocking Valley Railway (now part of the C. & O.) and on June 1, 1930, he was again appointed assistant cost engineer on the C. & O. In June, 1936, Mr. Edwards was promoted to supervisor of track at Louisa, Ky., and in January, 1938, he was transferred to Columbus, Ohio. His promotion to assistant division engineer was effective December 16.

Arthur Wayland Van Riper, whose promotion to assistant engineer of the Detroit division and the Detroit terminal of the Grand Trunk Western, with headquar-

Arthur Wayland Van Riper

ters at Detroit, Mich., was announced in the January issue, was born at Flint, Mich., on September 21, 1904, and entered railway service on July 1, 1922, as a porter in the transportation department at Durand, Mich., later serving successively at that point as a stenographer, clerk, rodman, draftsman, and instrumentman. On September 1, 1932, he was transferred to Detroit, and on December 1, 1940, he was promoted to assistant engineer of the Detroit division, including the Detroit terminal.

Roy C. Matthews, whose promotion to division engineer of the Panhandle & Santa Fe, with headquarters at Slaton, Tex., was announced in the February issue, was born on February 10, 1899, and attended Oklahoma A & M College. He entered railway service on June 29, 1918, as a chainman in the engineering department at Wellington, Kan., leaving on September 15, 1918, to serve in the U. S. Army. He returned to Wellington as a chainman on January 10, 1919, and was promoted to rodman six months later. In the fall of 1919 he left the service to return to college and on August 1, 1922, he returned to Wellington as a rodman. Mr. Matthews was promoted to transitman on June 30, 1923. On March 16, 1937, he was promoted to assistant engineer on construction work in Texas, and on February 1, 1938, he was appointed roadmaster at La Junta, Colo., the position he held until his recent promotion.

W. K. Turner, whose promotion to assistant division engineer on the Louisville & Nashville, with headquarters at Birmingham, Ala., was announced in the February issue, was born at Cave City, Ky., on July 25, 1892, and attended the University of Kentucky from 1908 to 1913. He entered railway service on January 1, 1916, as a rodman on the L. & N. at Louisville, Ky., and six months later he joined the U. S. Army. In September, 1919, he returned to the L. & N. as a draftsman at Louisville and served in that capacity and as an instrumentman until February, 1924, when he was appointed resident engineer at New Orleans, La. A year later Mr. Turner was transferred to Louisville and in January, 1930, he was promoted to assistant engineer in the office of the chief engineer. In November, 1940, he was appointed assistant engineer at Latonia, Ky., and on January 15, he was promoted to assistant division engineer at Birmingham.

Ned V. Scott, assistant engineer in the office of the chief engineer of the Southern Pacific Lines in Texas and Louisiana, has been promoted to engineer of water and fuel service, with headquarters as before at Houston, Tex., succeeding **J. L. Durland,** who retired on January 31. Mr. Durland was born in Flora, Ill., on January 22, 1871, and entered railway service in 1889 as a machinist apprentice on the Atchison, Topeka & Santa Fe at Gainesville, Tex. He was later transferred to Galveston, Tex., and after completing his apprenticeship, went with the Illinois Central at Vicksburg, Miss. In 1894 he returned to the Santa Fe at Galveston and in 1901 he became associated with the late G. W. Boschke, chief engineer for the Southern Pacific on terminal construction at Island, Tex. On the comple-

J. L. Durland

tion of that project, Mr. Durland went with the engineering department of the Southern Pacific at Galveston and in 1918 he was transferred to Houston as head of the fire prevention bureau, which he organized. Shortly after the first World War, Mr. Durland was appointed engineer of water and fuel service.

Mr. Scott was born at Swanton, Ohio, on November 13, 1890, and graduated from the University of Alabama in 1911, and from the University of Michigan in 1914, after which he took post graduate work at the latter institution in 1915. Until 1917, he then worked on construction on the Southern, and from 1917 to 1919 he served in the U. S. Army as a second lieutenant in the 215th engineers. In 1919 he returned to railroad service on the Southern Pacific. In 1924 Mr. Scott was promoted to assistant engineer in the office of the chief engineer and since that time, he has been in charge of various large construction projects, including the construction of the 230-ft. bascule bridge over the Neches river at Beaumont, Tex., which is the longest single leaf railroad span in the world. His promotion was effective February 1.

L. J. Drumeller, whose promotion to engineer of track of the Chesapeake & Ohio, with headquarters at Richmond, Va., was reported in the February issue, was born at Richmond on September 13, 1897, and entered railway service with the Chesapeake & Ohio on July 15, 1915, as

L. J. Drumeller

a rodman on the Eastern General division, being promoted to instrumentman on the Huntington division on August 15, 1917. Mr. Drumeller later served on the Louisville & Nashville as an instrumentman at Irvin, Ky., on the Missouri Pacific as a draftsman at St. Louis, Mo., and from July 16, 1918, to January 1, 1919, in the United States Army at Fort Monroe, Va., returning on the latter date to the C. & O. as an instrumentman at Ashland, Ky. He was promoted to assistant division engineer of the Chicago division on June 15, 1920, and after a year in this capacity he was appointed computer at Richmond. On March 1, 1922, he again left the C. & O. to go with the International Nickel Company as an assistant engineer, and after several months in this capacity he accepted a similar position with the Island Creek Railway Company at Holden, W. Va. On September 1, 1923, he returned to the C. & O. as an assistant engineer at Huntington, being promoted to assistant division engineer at Richmond on July 15, 1925, later being transferred to Russell, Ky. In 1929, Mr. Drumeller was promoted to division engineer at Hinton, where he was located at the time of his recent promotion to engineer of track.

Harry R. Younger, whose promotion to district engineer of the Alberta district of the Canadian Pacific, with headquarters at Calgary, Alta., was announced in the January issue, was born at Montreal, Que., on November 18, 1885, and attended

Ottawa Collegiate and McGill University, Montreal, graduating from the latter institution in 1910. He entered railway service in April, 1906, as a rodman in the maintenance of way department of the Canadian Pacific at Ottawa, Ont., and later served between terms of school as a chainman and a transitman on construction work in Saskatchewan and in the maintenance of way department at Montreal. In 1910 Mr. Younger was appointed instrumentman and resident engineer on the location and construction of the Kootenay Central branch in British Columbia and in 1915, he was appointed assistant engineer on the Inter-colonial Railway (now part of the Canadian National) at Levis, Que. In 1916 he was assigned to the Laboratory of Gauges and Standards of the Imperial Ministry. He returned to the service of the Canadian Pacific as a transitman on the Vancouver division in 1920, and in 1923, he was advanced to assistant engineer in charge of the concrete lining of the Connaught tunnel at Glacier, B. C. Two years later, Mr. Younger was promoted to roadmaster of the Revelstoke division, and in 1928 he was advanced to

Harry R. Younger

division engineer of the Kootenay division, with headquarters at Nelson, B. C. In the latter part of 1938 he was promoted to superintendent, with headquarters at Penticton, B. C.

Hurieosco Austill, chief engineer of maintenance of way and structures of the Gulf, Mobile & Ohio, with headquarters at Mobile, Ala., has been appointed chief engineer of the Terminal Railroad Association of St. Louis, with headquarters at St. Louis, Mo., succeeding **Herman J. Pfeifer,** who has been appointed consulting engineer, with the same headquarters.

Mr. Austill was born at Spring Hill, Ala., on May 16, 1884, and graduated in civil engineering from the University of Alabama in 1906, later taking a special course at Cornell university. He entered railway service in October, 1901, as a rodman on construction on the Louisville and Nashville and later served in various engineering capacities with several railroads and with the Republic Iron & Steel Company. On May 16, 1906, after his graduation, he became a resident engineer on railroad location and construction with the Mississippi Eastern. In August, 1906, he went with the Louisville & Nashville as assistant resident engineer at Birmingham, Ala., and for two years, beginning with August 11, 1908, he was with the United States Engineer Corps. At the end of this period he went with the Mobile & Ohio as an assistant engineer, and on

Hurieosco Austill

April 1, 1911, he was promoted to bridge engineer. On September 2, 1917, Mr. Austill entered active service with the United States Army as captain of engineers, later being commissioned major of engineers. Following his discharge from the army, he returned to the M. & O. as bridge engineer and on September 1, 1937, he was advanced to chief engineer. When the merger of the Gulf, Mobile & Northern and the Mobile & Ohio to form the Gulf, Mobile & Ohio was consummated in 1940, Mr. Austill was appointed chief engineer of maintenance of way and structures of the latter road, with headquarters at Mobile. Mr. Austill has been active in the affairs of a number of engineering societies and served from 1930 to 1937 as chairman of the Committee on Wooden Bridges and Trestles of the A.R.E.A. He is also a colonel in the United States Army, Engineer Reserve.

Track

J. Hilland, section foreman on the Canadian Pacific at Carberry, Man., has been promoted to roadmaster, with headquarters at Winnipeg, Man., succeeding **George York,** who has retired.

R. M. Nall, assistant supervisor of track on the Pittsburgh & Lake Erie, has been promoted to supervisor of track, with headquarters at Beaver Falls, Pa., to succeed **John F. Lash,** whose death is noted elsewhere in these columns. **J. L. Lash,** inspector, has been appointed assistant supervisor of track to succeed Mr. Nall.

L. F. Drake, track supervisor on the Davenport, Rock Island & North Western (joint track), with headquarters at Davenport, Iowa, has been promoted to roadmaster on the Chicago, Burlington & Quincy at Beardstown, Ill., succeeding **C. L. Flinn,** who has been transferred to Galesburg, Ill. Mr. Flinn relieves **C. L. Bouhan,** who retired on February 28.

M. G. Counter, track supervisor on the McCook division of the Chicago, Burlington & Quincy, has been promoted to roadmaster at Central City, Neb., succeeding **G. A. Olson,** who has been transferred to Lincoln, Neb. Mr. Olson replaces **A. J. Wright,** who has been transferred to Casper, Wyo., relieving **P. H. Brennan,** who retired on February 28.

O. Johnson, extra gang foreman on the Kootenay division of the Canadian Pacific, has been promoted to roadmaster of the Macklin, Reford and Kelfield subdivisions, with headquarters at Wilkie, Sask., succeeding **O. Totland,** who has been transferred to the Hardisty subdivision, with the same headquarters. Mr. Totland replaces **G. Larson,** who has been transferred to the Kootenay division, with headquarters at Cranbrook, B. C., relieving **A. E. Stewart,** whose promotion to division engineer, with headquarters at Nelson, B. C., is announced elsewhere in these columns.

A. W. Gobeli, general foreman of bridges and buildings and water service of the Panhandle & Santa Fe, with headquarters at Slaton, Tex., has been appointed roadmaster on the Atchison, Topeka & Santa Fe at La Junta, Colo., to succeed **Roy C. Matthews,** whose promotion to division engineer of the Panhandle & Santa Fe, with headquarters at Slaton, was announced in the February issue.

W. R. Garner, assistant supervisor of track on the Pennsylvania at Alliance, Ohio, has been promoted to supervisor of track at Cincinnati, Ohio, succeeding **A. W. Miller,** who has been transferred to Huntingdon, Pa., to relieve **W. T. Hammond.** Mr. Hammond has been transferred to Altoona, Pa., and **H. J. McNally,** assistant on the engineering corps, has been promoted to assistant supervisor of track at Alliance, replacing Mr. Garner.

W. H. Kendall, supervisor of track on the Pennsylvania at Union City, Ind., has been appointed supervisor in the office of the supervisor of operating expenditures at Philadelphia, Pa., and **Frank Aikman, Jr.,** supervisor of track at Carrothers, Ohio, has been transferred to Union City, succeeding Mr. Kendall. **G. M. Smith,** assistant supervisor of track at Perryville, Md., has been promoted to supervisor of track at Carrothers, replacing Mr. Aikman.

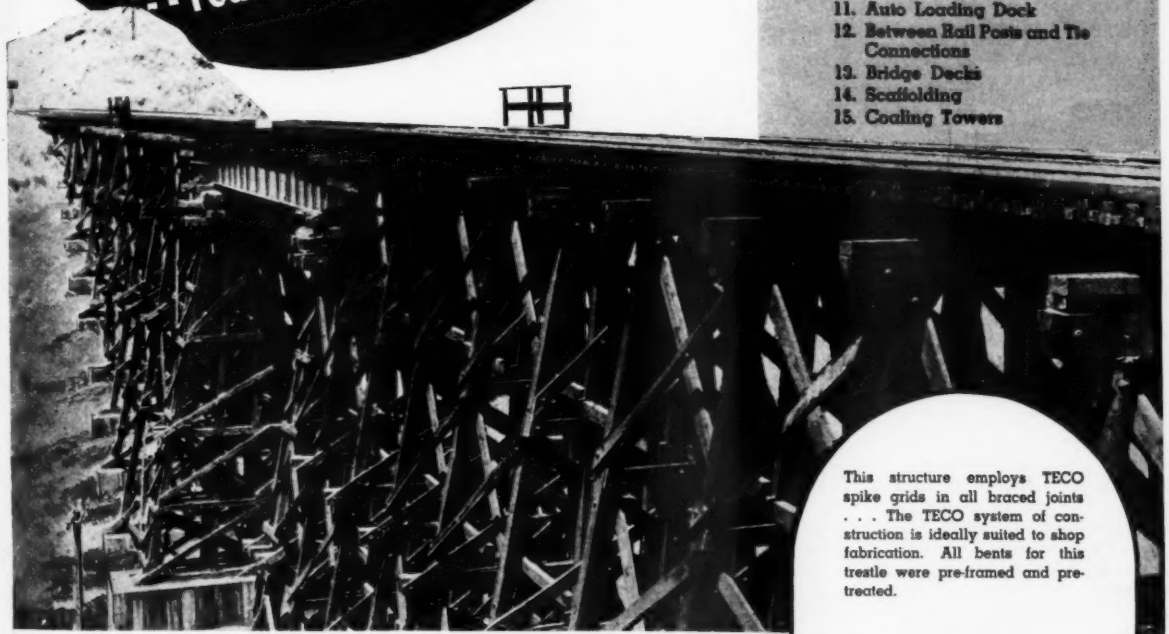
Robert Brent Melton, whose promotion to roadmaster on the Texas & New Orleans (part of the Southern Pacific), with headquarters at El Paso, Tex., was announced in the February issue, was born at Waco, Tex., on May 7, 1895, and studied a correspondence course in engineering. He entered railway service on May 1, 1912, as a rodman on the Fort Worth & Denver City and three years later he went with the Missouri-Kansas-Texas, serving as an instrumentman and assistant engineer. On September 10, 1921, he went with the Texas & New Orleans as an instrumentman, later serving as a draftsman and estimator. On June 8, 1931, Mr. Melton was appointed assistant engineer, later being appointed office engineer at Ennis, Tex. On March 31, 1936, he was appointed assistant bridge and building supervisor of the San Antonio division, with headquarters at San Antonio, Tex., which position he held until his promotion January 1.

(Continued on page 224)

Railway Designers find TECO CONNECTORS increase strength and rigidity . . . reduce maintenance

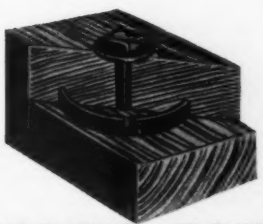
Types of railway structures using TECO TIMBER CONNECTORS INCLUDE:

1. Roof Trusses
2. Overhead Cranes
3. Timber Bents
4. Connections between pile heads and caps
5. Trestles
6. Ballast deck stub piles
7. Piers
8. Pier Fenders
9. Sway Bracing
10. Coal Pockets
11. Auto Loading Dock
12. Between Rail Posts and Tie Connections
13. Bridge Decks
14. Scaffolding
15. Cooling Towers



This structure employs TECO spike grids in all braced joints . . . The TECO system of construction is ideally suited to shop fabrication. All bents for this trestle were pre-framed and pre-treated.

NOW, because they strengthen timber joints, permit each member to do more work, and change timber from a carpentry to an engineering material, TECO CONNECTORS have made timber construction available for almost every type of railway structure which is expected to do a big job over a period of years. Forty-two important American railways have found that TECO CONNECTORS give timber construction a lot of new money-saving applications.



HERE'S HOW

The TECO split ring spreads the load on a timber joint over practically the entire cross-section of the wood.

In bolted joints stress is localized around the bolt . . . TECO CONNECTORS eliminate the necessity for over designing to permit sufficient area around joints to carry a large number of bolts.

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Without obligation, mail us your booklet "Railroad Timber Structures Made Stronger and More Economical with TECO Joint Connectors."

Company..... Individual.....

Street..... City..... State.....

John L. Southard, whose promotion to supervisor of track of the Columbus Terminal of the Chesapeake & Ohio, with headquarters at Columbus, Ohio, was announced in the January issue, was born at Marysville, Ohio, on November 26, 1901, and graduated in mining engineering from Ohio State University in 1924. He entered railway service on January 1, 1925, as a chainman in the engineering department of the Hocking division of the Chesapeake & Hocking (later the Hocking Valley, now part of the C. & O.) at Columbus, Ohio. In 1927 he was promoted to rodman and the following year to instrumentman. Mr. Southard was appointed an assistant cost engineer at Marion, Ohio, in 1929, and was transferred to Walbridge, Ohio, in 1931 and to Columbus in 1933. He was located at the latter point until his recent promotion, effective December 16.

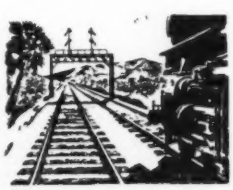
L. B. Hewlett, assistant cost engineer on the Chesapeake & Ohio, with headquarters at Richmond, Va., has been promoted to supervisor of track of the Shelby district, with headquarters at Pikeville, Ky., succeeding **J. G. Gilley,** whose appointment as assistant division engineer is noted elsewhere in these columns. Mr. Hewlett was born on February 9, 1906, at Blaine, Ky., and obtained his higher education at Virginia Military Institute. He entered railway service on June 17, 1929, with the C. & O. as a recorder on a recapture survey. On February 1, 1930, he was assigned to the office of the engineer maintenance of way at Richmond as a draftsman. From May 18, 1932, to April 7, 1934, he served as a laborer on various types of gangs on the Huntington division and also qualified as a crane operator on this division. On the latter date he was appointed assistant treating inspector at the company's timber treating plant at Russell, Ky., being appointed assistant cost engineer with headquarters at Richmond on August 17, 1936. He remained at Richmond until his promotion to supervisor of track which became effective on January 18.

Edwin McManus Pelter, assistant supervisor on the Alabama Great Southern (part of the Southern) at Birmingham, Ala., has been promoted to track supervisor on the St. Louis division of the Southern, with headquarters at Huntingburg, Ind., succeeding **D. B. Sisson,** who has been transferred to the Birmingham division, with headquarters at Birmingham, replacing **O. L. Hitchcock,** who retired on February 1. **W. C. Johnson,** assistant to the roadmaster at Somerset, Ky., has been promoted to assistant supervisor at Birmingham, relieving Mr. Pelter, and **J. E. Nitzschke,** assistant supervisor at Louisville, Ky., has been advanced to assistant to the roadmaster at Somerset, succeeding Mr. Johnson. **J. G. Beard,** student apprentice, has been promoted to assistant supervisor at Louisville, relieving Mr. Nitzschke.

Mr. Pelter was born at Memphis, Tenn., on January 30, 1912, and graduated from Virginia Polytechnic Institute in 1933. He entered railway service on June 9, 1933, as a draftsman on the Norfolk Southern. In 1937 he became a student apprentice on the Southern, serving at various points until March 1, 1939, when he was promoted to assistant to the roadmaster at Somerset, Ky. Mr. Pelter was advanced to assistant supervisor at Birmingham on June 24, 1940, which position he held until his recent promotion, effective February 1.

Benjamin Edwin Valde, whose promotion to roadmaster on the Canadian National, with headquarters at Burns Lake, B.C., was announced in the January issue, was born at Portage la Prairie, Man., on June 4, 1898, and graduated from Manitoba University in 1924. He entered railway service in September, 1915, as a clerk in the roadmaster's and superintendent's office of the Canadian National at Winnipeg, Man., and a year later was appointed a chainman at that point. From May, 1918, to October, 1918, he served as a leveller and steel inspector and from June, 1919, to August, 1919, he served as a signal fitter on the Canadian Pacific at Field, B.C., and Glacier, returning to the Canadian National in May, 1920, as a rodman at Winnipeg. He later served as a timekeeper, rodman and instrumentman on construction and in July, 1924, he became an instrumentman for the Reclamation department of the Province of Manitoba. Mr. Valde returned to the Canadian National in September, 1925, as an instrumentman at Prince Rupert, B.C., later being transferred to Prince George, B.C., where he was located until his recent promotion.

Robert L. Samuell, whose promotion to track supervisor on the Louisville & Nashville, with headquarters at Latonia, Ky., was announced in the February issue, was born at New Castle, Ky., on April 9, 1904, and graduated in civil engineering from the University of Kentucky in 1926. He entered railway service on June 10, 1926, as a section laborer on the Louisville terminals of the L. & N., later serving as a laborer on a bridge gang and on a signal gang. In January, 1927, he was appointed a rodman in the engineering department of the Louisville division. In July, 1928, he was promoted to junior instrumentman and later that month to senior instrumentman, serving in the latter capacity on the Louisville terminals and on the Knoxville and Atlanta division until March, 1933, when he was furloughed because of a reduction in force. Mr. Samuell then served in the U. S. Forest Service as a transitman, assistant party chief and party chief and as a resident engineering inspector for PWA until November, 1936, when he returned to the L. & N. as senior instrumentman on the Knoxville & Atlanta division, later being transferred to the Cincinnati division. In June, 1938, he was appointed a draftsman in the bridge department at Louisville and in April, 1940, he was promoted to assistant engineer on the Cincinnati division at Latonia, Ky., which position he held until his recent promotion to track supervisor at Latonia, Ky.



Bridge and Building

Alfred Brown, bridge and building foreman, has been promoted to general foreman of bridges and building and water service of the Panhandle & Santa Fe, with headquarters at Slaton, Tex., succeeding **A. W. Gobeli.**

J. M. Erickson, supervisor of bridges and buildings of the Ann Arbor Railroad, with headquarters at Owosso, Mich., has been appointed supervisor of bridges and buildings of the Montpelier division of the Wabash, with headquarters at Montpelier, Ohio, succeeding **F. R. Micheal,** who has been promoted to division engineer at Moberly, Ohio. **T. K. Anderson** has been appointed supervisor of bridges and buildings of the Ann Arbor, replacing Mr. Erickson.

Herman Lewis Koch, whose retirement as supervisor of bridges and buildings on the New York, Chicago & St. Louis (Nickel Plate), with headquarters at Conneaut, Ohio, was announced in the February issue, was born at Dunkirk, N. Y., on March 9, 1869, and entered railway service in June, 1888, as a machinist on the Nickel Plate at Conneaut. On November 17, 1889, he became a carpenter in the maintenance department of the Eastern division, and on September 11, 1902, he was promoted to carpenter foreman. Mr. Koch was advanced to supervisor of bridges and buildings at Conneaut on July 16, 1920.

Bernard W. Merrill, whose promotion to supervisor of bridges and buildings on the New York, Chicago & St. Louis (Nickel Plate) at Conneaut, Ohio, was announced in the February issue, was born at Little Valley, N. Y., on January 19, 1899, and entered railway service on September 17, 1917, as a rodman on the Nickel Plate at Cleveland, Ohio. In June, 1918, he enlisted in the U. S. Navy, returning to the Nickel Plate as a rodman at Cleveland on February 2, 1919. On November 29, 1920, he was promoted to assistant engineer at Conneaut, Ohio, and on March 16, 1936, he was advanced to assistant supervisor of bridges and buildings at Conneaut.

Obituary

John F. Lash, supervisor of track on the Pittsburgh & Lake Erie, with headquarters at Beaver Falls, Pa., died on January 21.

James Oscar Stephens, who retired as track supervisor on the Louisville & Nashville at Hazard, Ky., on January 1, 1939, died at Livingston, Ky., on December 21.

Charles Harry Moore, who retired in April, 1931, as valuation engineer for the Erie at New York, died at his home in that city after an illness of two years, at the age of 77.

Walter Loring Webb, author of "Railroad Construction" and "Economics of

(Continued on page 226)

To Users of Sperry Rail Service

By using SPERRY RAIL SERVICE in 1940, and previous years, you have undoubtedly profited as follows:

1 You have had the satisfaction of knowing that you have done the utmost for SAFETY, as related to rail.

2 You have used the most efficient means of fissure detection in existence (which fact Sperry gladly stands ready to prove).

3 You have combined ECONOMY with SAFETY (for example, the procedure of removing entire heats of rail from track has been practically eliminated by Sperry rail testing).

4 You have used a Maintenance of Way practice adopted by the Class I Railroads operating the major portion of track in the United States and Canada.

Hoboken, N. J. **SPERRY RAIL SERVICE** Chicago, Ill.

Railroad Construction," books which are considered standard texts in the railroad construction field, died at his home in Lansdowne, Pa., on January 24, at the age of 77. Mr. Webb graduated from Cornell University with a degree in civil engineering and was assistant professor of civil engineering at the University of Pennsylvania from 1893 to 1901.

H. A. Field, assistant engineer of bridges of the Baltimore & Ohio, Chicago Terminal, with headquarters at Chicago, was killed in an automobile accident in that city on February 13.

Ralph H. Washburn, division engineer on the Alton, with headquarters at Bloomington, Ill., died on January 28. Mr. Washburn was born in Sangamon County, Ill., on April 22, 1890, and attended the University of Illinois from 1908 to 1912. He entered railway service in August, 1912, in the engineering department of the Chicago & Alton (now the Alton) at Springfield, Ill., and a year later went with the Springfield Street Railway Company. Mr. Washburn returned to the Alton at Bloomington in May, 1916, and from June, 1918, to January, 1919, he served in the U. S. Navy, returning to the Alton on the latter date as assistant engineer at Springfield. He was transferred to Chicago in January, 1929, and was promoted to assistant division engineer at Bloomington in January, 1932. On January 1, 1941, he was advanced to division engineer, with the same headquarters.

Robert C. Falconer, assistant vice-president, engineering, of the Erie, with headquarters at Cleveland, Ohio, died on February 20. Mr. Falconer was born at St. Mary's, Pa., on March 21, 1874, and graduated from the University of Wis-

Robert C. Falconer

consin in 1895. He entered railway service in December, 1898, and until May, 1901, served consecutively as a transitman and resident engineer on the Pennsylvania Lines west of Pittsburgh. In October, 1905, he became an assistant engineer in the construction department of the Erie and in October, 1911, he was promoted to division engineer of the New York division, which position he held until October, 1912, when he was advanced to principal assistant engineer. From February, 1913, until January, 1916, he served as superintendent of construction, and on the latter date was appointed assistant chief engineer. In July, 1918, Mr. Falconer was promoted to assistant to the president and chief engineer, with headquarters at New York, and in February, 1927, he was appointed engineering assistant vice-president. In July, 1928, he was appointed assistant vice-president and chief engineer, and in June, 1929, he was appointed assistant vice-president in charge of engineering, with headquarters at New York. Mr. Falconer's headquarters were later transferred to Cleveland, Ohio.

Col. Joseph White Williams, chief engineer of the Western Pacific, with headquarters at San Francisco, Cal., died at St. Joseph's hospital in that city on February 4, after an illness of two weeks.

Col. Joseph White Williams

Col. Williams was born at Milan, Ohio, on October 20, 1879, and served in the Spanish-American War as a private in the 52nd Iowa Volunteer Infantry. He entered railway service in 1900 as a stakeman and later served as a transitman and assistant engineer on location and construction for the Atchison, Topeka & Santa Fe in New Mexico and California. In 1906, he was appointed acting chief engineer of the San Francisco & Northwestern, with headquarters at San Francisco and in 1907, when the Northwestern Pacific was formed, Mr. Williams was appointed assistant chief engineer, in charge of field work on the construction of a line through the Eel River canyon. In July, 1914, he was promoted to chief engineer of construction and during the first World War served in France as major of the first battalion, Eighteenth Engineers, later being commissioned lieutenant colonel. In July, 1919, he returned to the Northwestern Pacific as chief engineer in charge of construction and maintenance and on August 15, 1921, he went with the Western Pacific as chief engineer, which position he held until his death. Mr. Williams had been a colonel in the Engineer Reserve, U. S. A., since 1920. He was a charter member of the Society of American Military Engineers and had served as president and director of the San Francisco Post of that society. He also had served as president of the San Francisco unit of the Association of the Army of the United States and of the Army and Navy Club of San Francisco.

Association News

Roadmasters Association

A meeting of the Executive committee will be held in Chicago on Monday, March 10. President Clutz is now organizing the committees that are to study and report at the convention next September.

Bridge and Building Association

As announced in the February issue, all of the committees are now organized and actively engaged in the investigation of the subjects assigned to them for report at the convention next October.

Railway Tie Association

Officers of the Railway Tie Association, at a meeting in Louisville on February 3, arranged to hold the twenty-third annual convention at the Arlington Hotel, Hot Springs, Ark., on May 21-22.

Maintenance of Way Club of Chicago

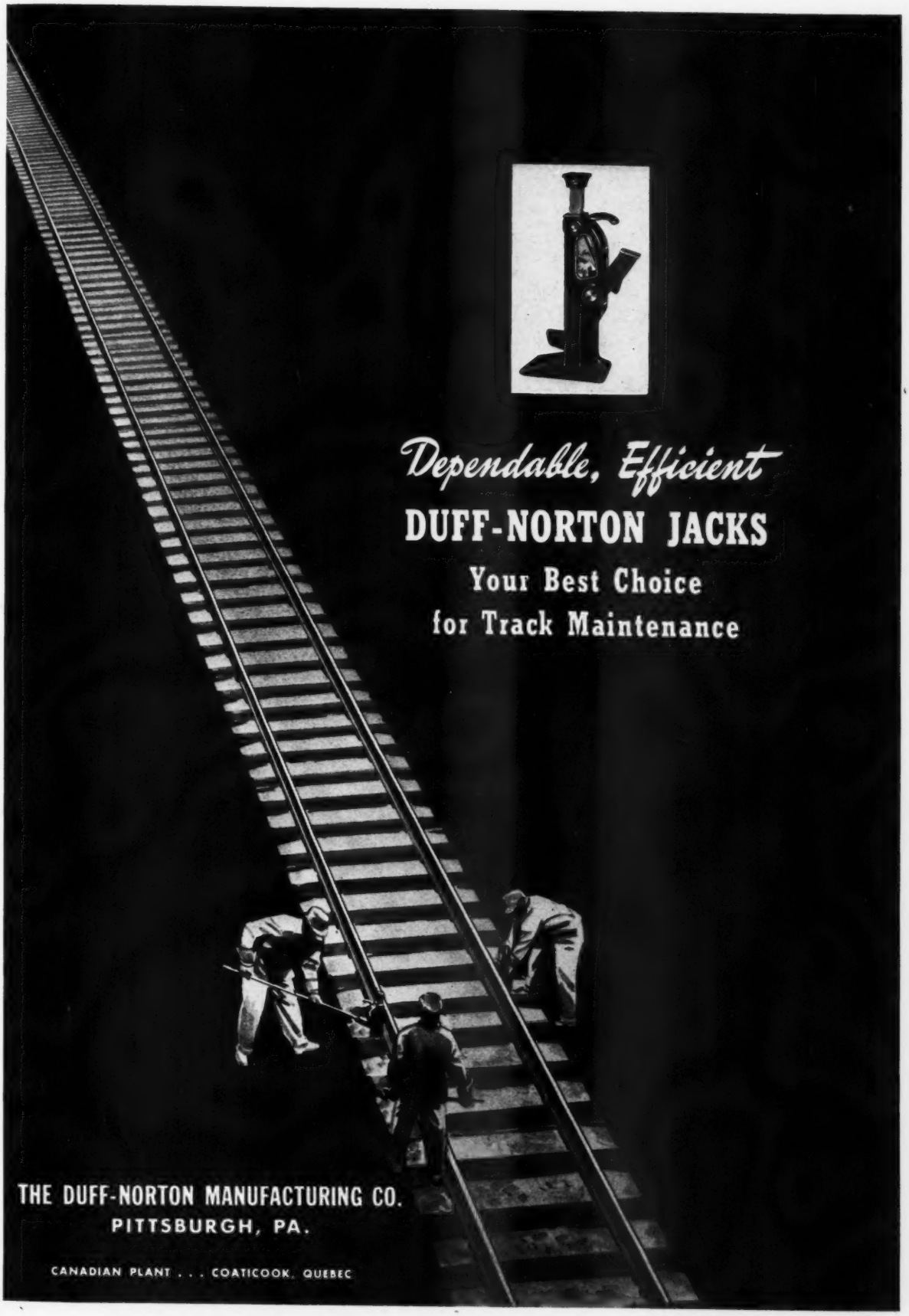
One hundred and three members and guests were in attendance at the meeting on February 24, which was addressed by W. S. Hanley, chief engineer, St. Louis Southwestern, on Stabilizing Track Through Subdrainage. In his remarks, Mr. Hanley told of how, through right-of-way sloping, ditching, driving stabilizing poles in the subgrade, and installing many miles of corrugated pipe subdrainage, his road was dried out and strengthened to make it a modern highspeed property. The next meeting of the club will be held on March 24.

Wood-Preservers' Association

Approximately 400 men gathered at the thirty-seventh annual convention at Louisville, Ky., on February 6, at which addresses were presented on Thirty-One Years' Experience with Treated Ties on the Lehigh Valley, by A. N. Williams, president of that railway; on The Uses of Treated Timber and Ties on the Louisville & Nashville, by L. L. Adams, engineer maintenance of way of that railway; and on The Revision of the Burlington Railroad's Bridge Standards to Reduce the Preframing of Creosoted Timber, by G. A. Haggander, assistant chief engineer of the C. B. & Q., in addition to many reports on timber treating practices and on service records. The next convention will be held in Minneapolis, Minn., on January 27-29, 1942.

At a meeting of the newly-elected Executive committee, immediately following the adjournment of the convention, a new Committee on Gum Ties and Lumber-Pressure Treatment was created, with C. S. Sizemore, general treatment inspector, I. C., Memphis, Tenn., as chairman. Among the chairmen who were reappointed were the following: J. S. Giddings, Preservatives (A. T. & S. F.); R. H. Rawson, Joint Committee on Douglas Fir—Pressure Treatment (cons. timber engr.); R. H. Mansfield, Southern Pine Piles—Pressure

(Continued on page 238)



Visit Our Exhibit at the NRAA Convention, Chicago, March 10-13 . . . Booths 32

Treatment (Amer. Creo. Co.); G. M. Hunt, Posts—Pressure Treatment (Forest Prod. Lab.); H. F. Round, Inspection (Penna.); A. J. Loom, Tie Service Records (N. P.); T. H. Strate, Bridge and Structural Timber (C. M. St. P. & P.); A. S. Daniels, Marine Piling Service Records (T. & N. O.); H. A. Haenseler, Pole Service Records (Western Union Tele. Co.); and H. R. Condon, Uses of Treated Wood for Car Lumber (Wood Preserving Corporation).

American Railway Engineering Association

As detailed elsewhere in this issue, plans have been completed for the forty-second annual convention of the association, at the Palmer House, Chicago, March 11-13, the activities of committees and the secretary's office during the last month being largely to this end. Two committees held final meetings in February, these being the Committee on Iron and Steel Structures, which met at Chicago on February 13 and 14, and the Special Committee on Impact, which met at Chicago on February 20.

Early in the month, the secretary's office sent out ballots for the election of officers and directors of the association, in accordance with the nominations reported in the January issue of *Railway Engineering and Maintenance*, and later in the month sent out the program booklet for the convention, and Bulletin No. 423, containing the last of the reports to be presented at the convention. This bulletin contains the reports of the committees on Ties, Wood Preservation, Rules and Organization, Roadway and Ballast, Track, Rail, and Stresses in Railroad Track, and the seventh progress report of the Joint Investigation of Fissures in Rails. About March 7, it is planned to send out Bulletin No. 424, the year book and program bulletin of the association, including a list of membership, so that it will be in the hands of members before leaving for the convention.

Supply Trade News

General

The Whiting Corporation, Harvey, Ill., has opened a district sales office in the Broad Street Station building in Philadelphia, Pa. **L. D. Reed** is in charge.

The Koppers Company has consolidated the New York headquarters of its tar and chemical, its wood preserving and its gas and coke divisions and the Koppers Coal Company at 60 East Forty-second street.

Personal

L. E. Connelly has been elected president of the **Cleveland Frog & Crossing Co.,** succeeding L. G. Parker who retired February 10.

John F. Van Nort has been appointed sales manager, Western division, of the **Duff-Norton Manufacturing Company** of Pittsburgh, Pa., with headquarters at the company's Chicago offices. Mr. Van Nort has been associated in various sales capacities with a United States Steel Corporation subsidiary for 17 years. He goes to Chicago direct from the Duff-Norton plant in Pittsburgh.

W. F. Munnikhuysen, president of the Wood Preserving Corporation has been elected a vice-president of the **Koppers Company,** Pittsburgh, Pa., and general manager of the Wood Preserving division, following the absorption of the Wood Preserving Corporation as a division of Koppers. **H. R. Condon** and **E. J. McGehee,** vice-presidents of the Wood Preserving Corporation have been made vice-presidents of the Wood Preserving division of Koppers. **D. C. Jones,** Chicago, **R. P. Jackson,** Texarkana, Texas, and **E. S. Park,** Nashua, N.H., have been made district vice-presidents in their respective territories.

Supplementing the item appearing in the January issue, to the effect that **C. N. Thulin** had been appointed manager of railway sales of the **Joyce-Cridland Company,** Dayton, Ohio, with headquarters at Chicago, **Earl E. Thulin** has been appointed western division manager of this company, with headquarters at Chicago. He has also formed the Earl E. Thulin Company.

Earl E. Thulin was born on May 8, 1901, in St. Paul, Minn., and after graduating from Lane Technical High School

Earl E. Thulin

in Chicago, entered the employ of the sales and service department of the Duff-Norton Manufacturing Company. Later he was promoted to district manager and in April, 1940, was elected vice-president and general manager of sales.

Obituary

Bert R. Hartwell, treasurer of the **Teleweld Corporation,** Chicago, died in that city on February 4, after a brief illness.

Frank C. Stowell, sales manager in New England for the American Fork & Hoe Co., with headquarters at Boston, Mass., died on February 1 at his home in Medford, Mass., a suburb of Boston. Mr. Stowell was born on January 27, 1863, at Quincy, Ill., and was educated at Harvard, graduating in 1887. Early in his business career Mr. Stowell served in the engineering and maintenance of way departments of the Boston & Maine, holding the positions of assistant engineer and roadmaster. From 1902 to 1927, he served with the Boston Elevated Railway as a roadmaster. At the end of this period he entered the railway supply field and subsequently became New England sales manager of the American Fork & Hoe Co.

Trade Publications

Pressure-Creosoted Laminex Culverts.—This is the title of an eight-page pamphlet issued by the Wood Preserving division of the Koppers Company, Pittsburgh, Pa., which is devoted to the creosoted laminated timber culverts that are built by this company. The design and construction of the culverts are described and illustrated and their advantages and applications are also listed.

Ruggedwear Resurfacer.—The Flexrock Company, Philadelphia, Pa., is distributing an illustrated four-page folder containing information showing the composition, uses, method of application, and advantages of its Ruggedwear Resurfacer. Six new products of this company introduced in 1940, are also listed.

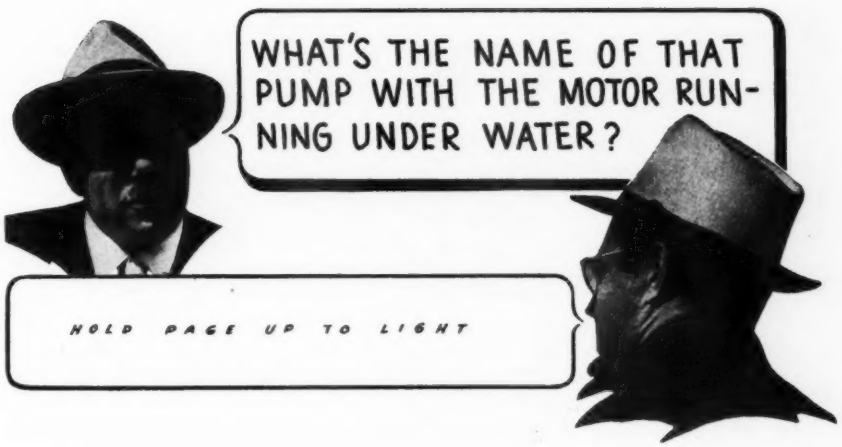
Pavement Breaker and Sheeting Driver.—The Worthington Pump & Machinery Corporation, Harrison, N. J., has issued a four-page folder containing essential information regarding its WB-85 pavement breaker and its WSD-85 sheeting driver. Other types of pneumatic tools, and a variety of compressor mountings manufacturer by this company, are also listed and illustrated in the folder.

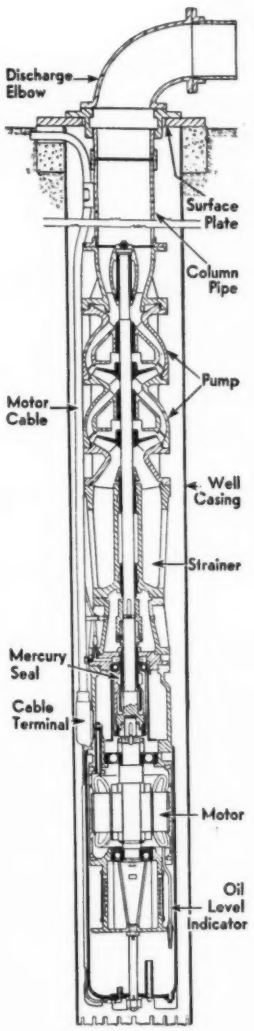
Water Treatment.—A mimeographed pamphlet has been issued by Proportioners, Inc., Providence, R. I., which contains typical specifications covering methods and equipment for feeding sodium phosphate, sodium sulphite and sodium sulphate to boiler feed water when treating it to prevent scale formation, corrosion, foaming and embrittlement in steam boilers. The specifications are illustrated by drawings and photographs.

Skilsaw Tools.—Skilsaw, Inc., Chicago, has published a 60-page catalog, No. 42, which describes the complete line of Skilsaw portable electric tools. Included in the descriptions are Skilsaw saws, abrasive discs, drills, belt sanders, disc sanders, hand grinders, suction cleaners and grass and hedge trimmers. Each model is illustrated by a photograph or drawing, and specifications are given. In addition, the catalog describes the construction and uses of the various tools and numerous accessories for each.

Arc Welding for Building Construction.—This is the title of a 16-page illustrated booklet that is being distributed by Air Reduction, New York. The booklet lists and discusses the advantages of arc welding when used in building construction, and contains a reprint of an article describing the use of arc welding in the construction of an important building in New York. Two pages of the booklet are devoted to a discussion of the fundamentals of design for welded structures. It also contains information regarding Wilson electrodes for structural welding and Wilson arc-welding units.

Here's a modern pump which is practically made-to-order for railroad water supply requirements. It pumps water from bored wells of *any* depth, or from ponds, rivers, lakes or other sources. No pump house is required, the only surface equipment being a weatherproof, tamper-proof switch-box, which can be mounted on a pole or platform — an ideal installation for isolated locations.





THE BYRON JACKSON SUBMERSIBLE is a short coupled pumping unit made up of an electric motor mounted below a deepwell turbine pump to which it is direct-connected. Both motor and pump operate completely submerged in water. Regardless of how deep the unit is installed in the well, *there is no long shaft* from a motor on the surface to the underground pump. The only rotating parts are those inside of the motor and pump case. Electric power is delivered from the switch-box to the submerged motor through a submarine type cable.

These Exclusive Features of the SUBMERSIBLE make it the ideal pump for railway water supply . . .

★ It is perfectly adapted where automatic operation is required, particularly in isolated installations demanding uninterrupted service without frequent inspection.

★ Only a weatherproof, tamperproof, metal switchbox is required at the surface—no pumphouse or above ground equipment is needed—and the switch-box may be mounted on a pole, platform or tower safe from vandals or animals.

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★ The short-coupled motor and pump eliminate the needless friction, wear, down-time and expense normally present when a long, heavy shaft is rotated in many bearings.

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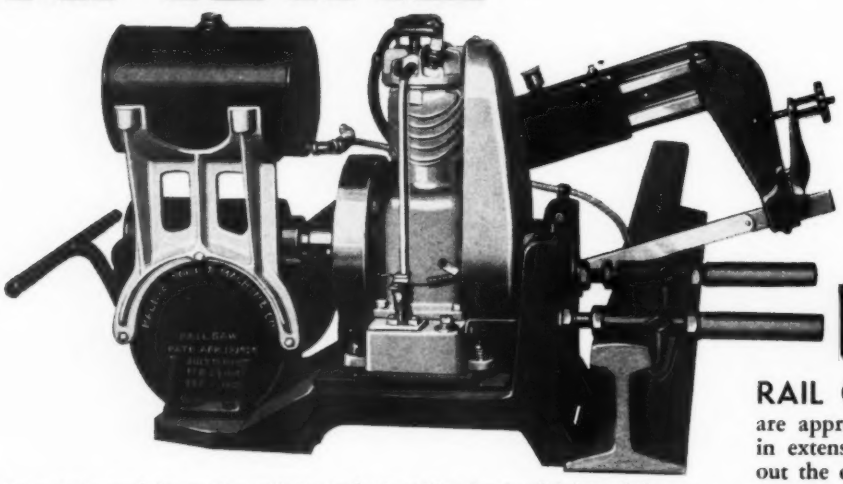

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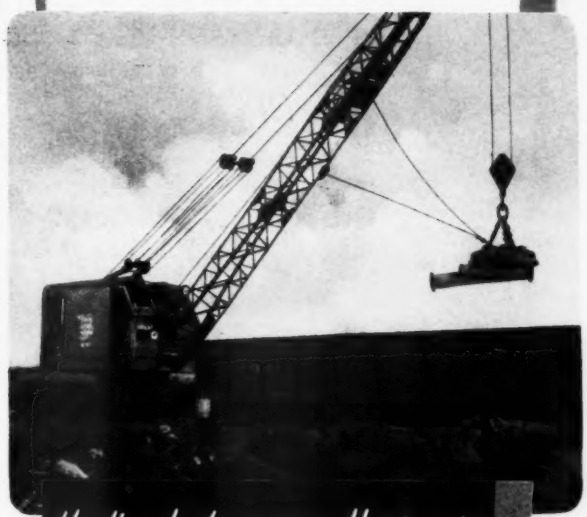

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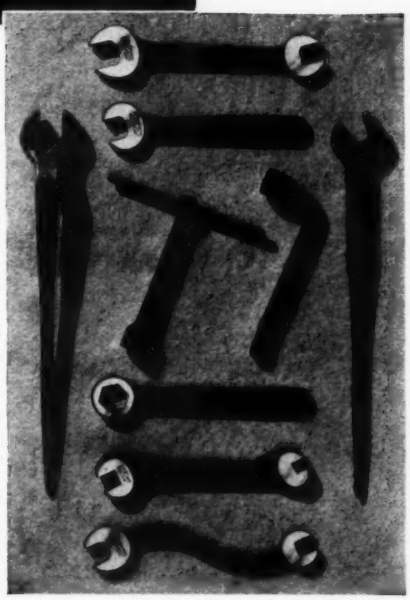

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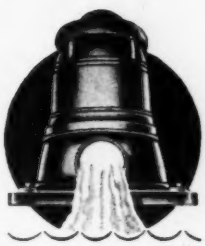

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. . . and with the extra POWER that does the job in about half the time required by other tampers. You get smoother, safer, more solidly tamped track—true surface and alignment will *last longer*— LABOR COSTS ARE REDUCED 20% to 30%.

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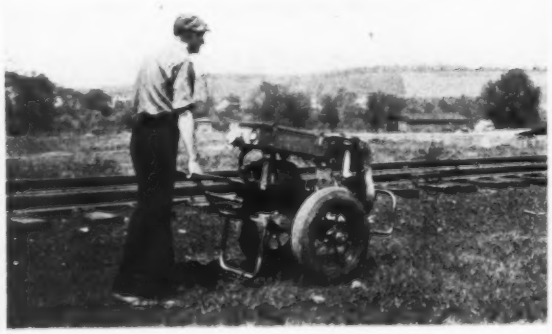

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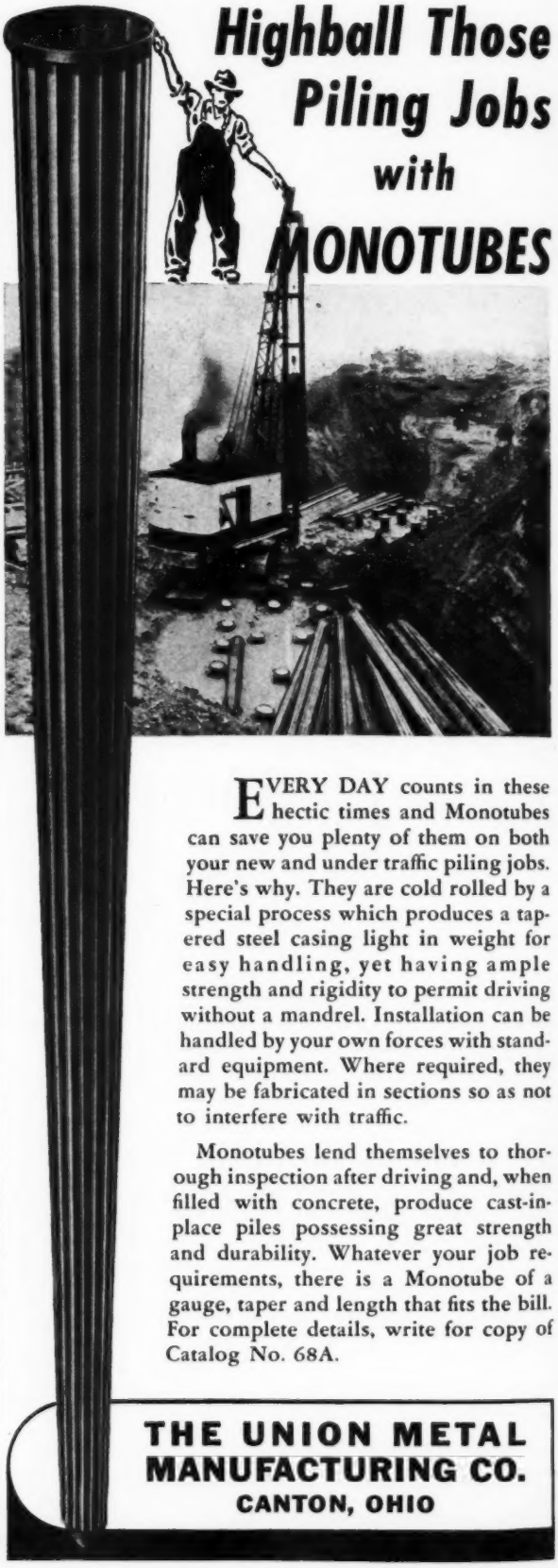

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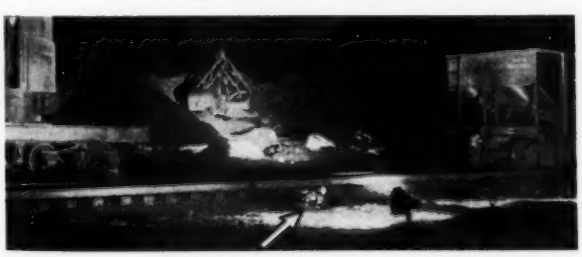

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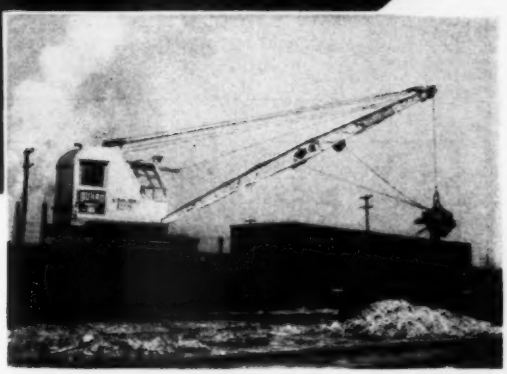

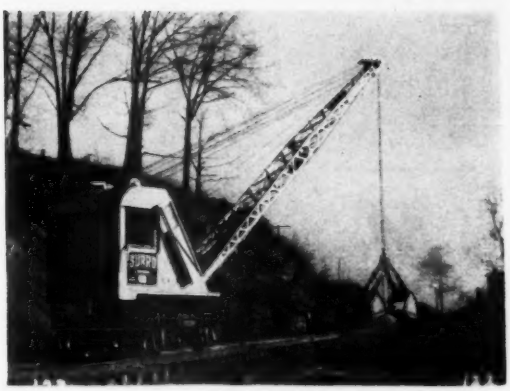

These small, efficient work units of proven capacity have such a wide range of utility, such an economy of operation, that there is no end to their daily usefulness. On the road, they travel fast, up to 22 miles per hour, and get out of the way quickly and easily, because Burro mechanism sets them off the track in two minutes. Other exclusive features including short tail swing and low overall height make Burro Cranes the choice where low cost operation means just that.

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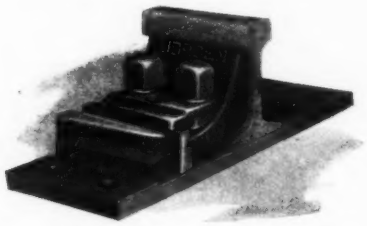

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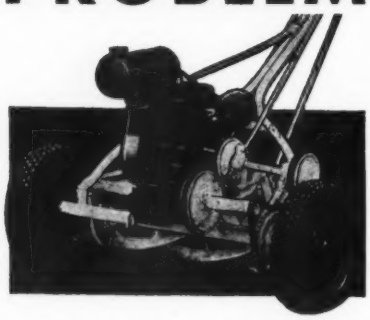

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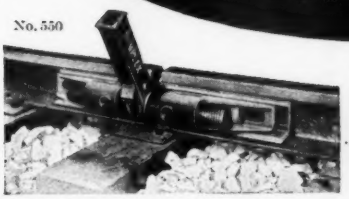
TAPES — RULES — PRECISION TOOLS

Open or Close Rail Joints This Easy Way!



Simplex Rail Pullers and Expanders speed lining of crossings and switches, eliminate pounding, do the job with four or five men instead of a rail gang. Insulated joints and end posts can be quickly renewed by one or two men.

Three models: No. 550, 25-tons capacity, No. 550A, 30-tons capacity, both are easily applied on outside of rails—no interruption of service. No. 555 has 15-tons capacity, is easily applied over ball of rail, readily opens or closes joints and is quickly taken off the rail. One or two men can operate it. A cost-cutting section tool.

Most roads are saving on track maintenance work with these practical tools. Made by the manufacturers of Simplex Electrided Gib Track Jacks and G-Y Tie Spacers.

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Awarded the Gold Medal for Safety

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Save Time and Money on Maintenance Jobs

THE Buda Tie Puller is a tested and proved track tool that saves time, money and labor in tie replacing. Read these 6 important features: (1) Many Class "A" Railroads used the Buda Tie Puller last season, enabling them, with regular section gangs, to replace 25% more ties at lower cost per tie. (2) Tie Puller bears on both rails — does not throw tracks out of line. (3) Low first cost — low enough to economically equip every section crew. (4) Weighs but 54 lbs. — compact, easily carried by one man. (5) Firmly grips soft or hard ties. (6) Can be used regularly with section crews of 3 or more men. *Write for complete details.*

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For Railway Equipment and Supplies

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Avoid accidents! Prevent costly delays. Repair station platforms, steps, crossings, concrete floors, or resurface an entire area with the durable RUGGEDWEAR RESURFACER. No chopping or chipping required. Merely sweep out spot to be repaired—mix the material—trowel it on. Holds solid and tight right up to irregular edge of old concrete. Used indoors or out. Dries fast. Costs only 10c to 14c per sq. ft.

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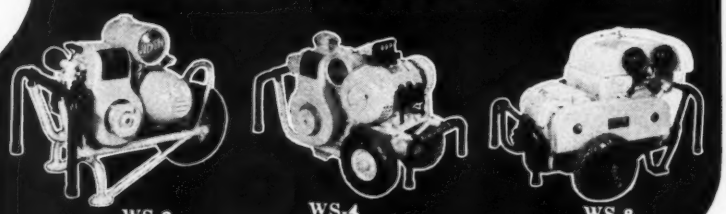

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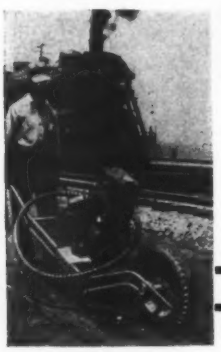

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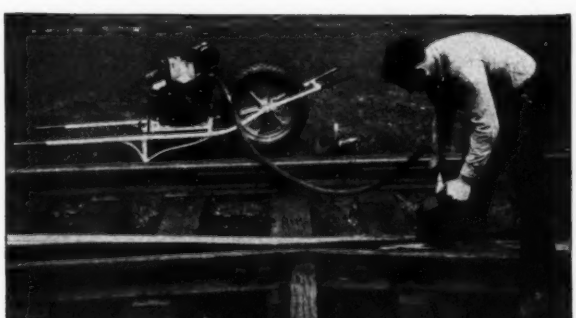

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See Ramapo Ajax Division.

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See Pittsburgh Screw and Bolt Corporation.

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